S. HRG. 99-666

GEOTHERMAL STEAM ACT AMENDMENTS OF 1985

HEARING

BEFORE THE

SUBCOMMITTEE ON
NATURAL RESOURCES DEVELOPMENT AND
PRODUCTION

OF THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

NINETY-NINTH CONGRESS

SECOND SESSION

ON

S. 1322

A BILL TO AMEND THE GEOTHERMAL STEAM ACT OF 1970

APRIL 24, 1986

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GEOTHERMAL STEAM ACT AMENDMENTS OF 1985

THURSDAY, APRIL 24, 1986

U.S. SENATE,
SUBCOMMITTEE ON NATURAL RESOURCES
DEVELOPMENT AND PRODUCTION,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m., in room SD-366, Dirksen Senate Office Building, Hon. Chic Hecht, presiding.

Present: Senators Hecht, Wallop, and Murkowski.

Also present: Robert L. Terrell, professional staff member; and Patricia J. Beneke, counsel for the minority.

OPENING STATEMENT OF HON. CHIC HECHT, A U.S. SENATOR FROM THE STATE OF NEVADA

Senator HECHT. Good morning, everyone. This morning the Subcommittee on Natural Resources Development and Production, of the Committee on Energy and Natural Resources, will now convene.

This morning the subcommittee will receive testimony on S. 1322, a bill to amend the Geothermal Steam Act of 1970, S. 1322 was introduced by myself on June 19, 1985, in order to resolve some unfinished business concerning geothermal leasing reform. While I recognize that some of my colleagues may think that this topic is a rather arcane and unimportant one, I would like to take a minute to expose a problem which is threatening to unravel the many hard-earned gains we have made over the past 10 years in the development of America's abundant geothermal resources.

The Congress passed the Geothermal Steam Act in 1970 to encourage the leasing and development of geothermal resources located on Federal lands. Spurred by the early success in harnessing northern California's dry steam for electricity production, many of us believed or hoped that passage of the Steam Act would ensure rapid development at the many other geothermal fields known to exist in the Western United States.

Fifteen years later, we are still waiting for that development to occur. The combination of large front-end development costs, risky powerplant technology and uncertainty over future world energy prices has led to the cancellation or delay of many promising geothermal power projects.

These problems are now being compounded by certain inflexible provisions of the Steam Act which prohibit the extension of leases where diligent field development has occurred but actual powerplant construction has been delayed by market forces.

Section 319 of last year's continuing resolution gave geothermal leaseholders a temporary respite by allowing for the conditional 2-year extension of original 10-year leases issued under the Steam Act. The bill I am introducing today will provide a permanent mechanism for the granting of up to three successive 5-year extensions if the following conditions are met:

A full report must accompany the developer's extension request, explaining why they have not been able to produce geothermal energy in commercial quantities, and either: One, drilling to a depth specified by the Secretary of the Interior has commenced prior to each successive extension request, or, two, substantial investment—in excess of due diligence requirements—has been made in lease or lease unit up to time of extension request.

In addition, my bill would strengthen the Geothermal Steam Act's provisions for Secretarial review of unit and cooperative plans, where developers have proposed the integrated development of several individual leases.

In past years, the Department of the Interior has arguably been too generous in allowing companies to block up leases in large units in order to avoid acreage limitations under the act. As unit plans come up for review, every 5 years under current regulations, my bill will require the Secretary to consider dropping leases which are not reasonably necessary to the economic viability of a unit or a cooperative plan.

Finally, I would like to address a related issue that has frustrated our past attempts to amend the Geothermal Steam Act: National parks' protection. Many members of this body, including the late Senator Jackson and my colleague Senator Melcher, have sought to provide statutory protection for significant geothermal features in our National Park System.

Our best known example is the Old Faithful Geyser in Yellowstone National Park, which some experts believe may be threatened by geothermal development outside the park boundary.

It has also been proposed that Congress authorize the establishment of buffer zones around some 20 other national parks and monuments containing geothermal features, even though there does not appear to be any development interest in these areas. This idea has kindled a raging philosophical debate of the general concept of buffer zones, which, in turn, has poisoned the chances for congressional passage of earlier geothermal leasing bills.

I have no interest in picking a quarrel on the park protection issue, but it seems to me that we should not let it interfere with the passage of legislation which I believe is essential to the timely development of our Nation's abundant and environmentally benign geothermal resources.

How many times have you heard people first say that they oppose conventional energy projects because of the superiority of alternative, soft path approaches, and then turn around and throw obstacles in the way of these very same alternative technologies? We have recently seen this happen with small hydropower projects,

wind power, cogeneration, and a host of other exciting new technologies.

I know this is not their intent, but by delaying legislation, the park protection advocates have dealt a serious blow to the entire geothermal industry because of their opposition to development in a few specific areas of the country.

I hope we will not let this happen to geothermal; let us get on with this legislation and give geothermal energy a fighting chance to compete in our energy marketplace and contribute to our energy security. If the industry can revive itself and development interest ever materializes around these other national parks, which I seriously doubt, then Congress can take appropriate steps to protect them.

This is a responsible bill which has been shaped by years of hearing testimony and congressional debate on geothermal leasing. I have stripped away all but the most essential elements of earlier, more comprehensive leasing proposals in the hopes of achieving prompt bipartisan support on this issue.

It is absolutely critical that we resolve this issue in the 99th Congress.

I look forward to hearing from the distinguished witnesses here this morning. I should also point out that the record for this hearing will remain open for 2 weeks in order to receive testimony from those unable to be here today, and to permit those appearing today to respond to followup written questions that members of the subcommittee may wish to submit to you in writing.

I also want to announce that Chevron Corp. has provided a statement for the record.

[The text of S. 1322 and the prepared statement of Mr. Cooper from Chevron Corp. follow:]

II

99TH CONGRESS
1ST SESSION

S. 1322

To amend the Geothermal Steam Act of 1970.

IN THE SENATE OF THE UNITED STATES

JUNE 19 (legislative day, JUNE 3), 1985

Mr. HECHT introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

---

A BILL

To amend the Geothermal Steam Act of 1970.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Geothermal Steam Act Amendments of 1985".

SEC. 2. Sections 6 (a), (c), and (d) of the Geothermal Steam Act of 1970 (30 U.S.C. 1005) are amended to read as follows:

"(a) Geothermal leases shall be for a primary term of ten years. If geothermal steam is produced or utilized in commercial quantities on a lease or under an approved cooperative or unit plan of development or operation in which a lease is included within this term or any administrative extension

thereof under subsection (c), such lease shall continue for so long thereafter as geothermal steam is produced or utilized in commercial quantities, but such continuation shall not exceed an additional forty years.".

"(c) Any geothermal lease issued pursuant to the Act and in effect on or after July 27, 1984, shall be extended for successive five-year periods, but totaling not more than fifteen years, if—

"(1) the lessee has submitted a report to the Secretary detailing bona fide efforts to bring such lease or approved cooperative or unit plan of development into commercial production, given the then current economic conditions; and either

"(2) actual drilling operations, to a depth specified by the Secretary, were commenced prior to the end of its primary term and prior to the end of each successive five-year extension period on such lease or on another lease to the benefit of such lease where, at the time application for extension is made, both leases are included in an approved cooperative or unit plan of development; or

"(3) in the opinion of the Secretary, substantial investment has been made during the primary term and during each successive five-year extension period on such lease or on another lease to the benefit of such

lease where, at the time application for extension is made, both leases are included in an approved cooperative or unit plan of development.

"(d) For purposes of subsection (a) of this section, production or utilization of geothermal steam in commercial quantities shall be deemed to include the completion of a well capable of producing geothermal steam in paying quantities.".

SEC. 3. Section 18 of the Geothermal Steam Act of 1970 (30 U.S.C. 1017) is amended by inserting the following new paragraph after the first full paragraph of that section:

"Five years after approval of any cooperative or unit plan of development or operation, and every five years thereafter, the Secretary shall review each such plan and, after notice and opportunity for comment, eliminate from inclusion in such plan any lease or part of a lease not regarded as reasonably necessary to cooperative or unit operations under the plan. Any lease or part of a lease so eliminated would be eligible for an extension under section 6(c) of this title if it separately meets the requirements for such an extension.".

SEC. 4. Every geothermal lease issued pursuant to the Geothermal Steam Act of 1970 and in effect on or after July 27, 1984 is eligible for an administrative extension under section 6(c) of that Act as amended if an application for such an extension is timely submitted either within one hun-

dred and eighty days of the date of enactment of this Act or sixty days prior to the expiration of the lease's primary term, whichever is later.

STATEMENT

of

A. M. COOPER

VICE PRESIDENT, GEOTHERMAL - CHEVRON RESOURCES COMPANY

Before the

SUBCOMMITTEE ON NATURAL RESOURCES DEVELOPMENT AND PRODUCTION

ENERGY AND NATURAL RESOURCES COMMITTEE

U. S. SENATE

in support of

S. 1322

GEOTHERMAL STEAM ACT AMENDMENTS

APRIL 24, 1986

Chevron Resources Company, which is wholly owned by Chevron Corporation, is responsible for Chevron's efforts to diversify into the non-hydrocarbon minerals and geothermal energy businesses. We have mining or geothermal operations in California, Montana, Nevada, New Mexico, Texas and Utah and have extensive exploration activities in a number of other states as well as several foreign countries.

Chevron has been and continues to be optimistic about the future of geothermal resource development. We've recently completed two projects at our Heber geothermal field in Southern California's Imperial Valley. Chevron Resources supplies hot water from the Heber field to two power plants capable of producing over 110 megawatts of electricity. This field is estimated to have the potential to produce over 300 megawatts of electricity. In addition to the startup at the Heber plants, we also placed in production a 16 megawatt plant at Beowawe, Nevada in late 1985.

Our recent acquisition of geothermal interests in Nevada, Utah and Oregon, from Phillips Petroleum Company added two additional producing geothermal fields as well as other geothermal resources to our operations. The producing fields are at Roosevelt, Utah and Desert Peak, Nevada and supply hot water to 20 megawatt and 9 megawatt power plants, respectively.

Each of our geothermal power generating operations has been developed with Federal geothermal leases included in the production area. We have over 80 Federal geothermal leases covering over 90 thousand acres in California, Oregon, Nevada and Utah. These leases are in various stages of evaluation and development. For a number of technical and economic reasons, however, many are not likely to be in production during their primary term or during the conditional two year extension to the original 10 year leases allowed by the continuing resolution in 1984.

The Geothermal Steam Act of 1970 limits the extension of Federal geothermal leases even if diligent field development has occurred but actual powerplant construction, sale of geothermal steam, or other commercial production has been delayed by economic or technical reasons. The proposed Geothermal Steam Act Amendments (S. 1322) provide a reasonable solution to the problem of a lessee facing lease cancellation in an area where substantial investment in the geothermal field has already been made but sales agreements, power plant construction or other commercial production has been deferred.

We support the provisions of Section 2 which would deem completion of a well capable of producing geothermal steam in paying quantities as satisfying production requirements for lease retention and which would allow at least three successive five year lease period extensions under certain conditions. While we have no problems with the conditions outlined in Section 2(c) (1) and (2), we are somewhat concerned with the lack of definition of "substantial investment" in the opinion to be made by the Secretary under proposed Section 2(c)(3). We expect that the Secretary would promptly promulgate rules or guidelines defining "substantial investment" shortly following enactment of this legislation.

It's our opinion that Section 3 of the bill, which provides for a five year review of any cooperative or unit plan of development or operation, is not necessary. The procedures for forming a unit plan or cooperative unit involving Federal geothermal leases are sufficiently stringent to prevent the inclusion of lease acreage which is ". . . not regarded as reasonably necessary to cooperative or unit operations . . .". A review of the unit plan every five years would unnecessarily burden the lessee and the BLM.

In summary, we strongly support the objective of this proposed legislation to allow extension of Federal geothermal leases on a rational basis. This approach would allow the

continued development of the geothermal energy business where substantial progress has already been made. Geothermal power generation has several distinct advantages over conventional fossil fuel or nuclear generated power. Geothermal units can be added in small increments and quickly. (For example, our Beowawe, Nevada plant was constructed in six months.) They lessen our dependence on foreign energy sources and are compatible with surrounding land uses.

We fully expect there to be a sharp increase in demand for electrical energy generating capacity in the 1990's. Geothermal resources can and will play a significant role in satisfying that demand if Federal geothermal leasing policy is modified as proposed in this bill to allow lease terms which reflect the economic and technical realities of today.

Thank you for this opportunity to provide comments on this important legislation.

Senator HECHT. With that somewhat lengthy introduction, we will now begin with our first witness, Mr. Robert Lawton, Deputy Assistant Director for Energy and Mineral Resources. I would ask you if you have a written statement, to submit it, and try to summarize in 10 minutes.

STATEMENT OF ROBERT H. LAWTON, DEPUTY ASSISTANT DIRECTOR, ENERGY AND MINERAL RESOURCES, BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR

Mr. LAWTON. Yes; I have a written statement and I would like to submit it for the record, with your permission.

Senator HECHT. Thank you, very much.

Mr. LAWTON. Mr. Chairman, I appreciate the opportunity to appear before the subcommittee today to discuss the Department of the Interior's position on S. 1322.

We support enactment of S. 1322, as we feel it would enhance the opportunity for the exploration and development of geothermal resources. The Department believes geothermal energy does have a promising future.

We have experienced some evidence of this on Federal lands to date. I would like to provide a little background of what we have done in the way of developing geothermal energy on Federal lands.

The first Federal leases were not issued until 1974, and production for these leases did not take place until 6 years later. So, basically, even though the Geothermal Steam Act was passed in 1970, there was no production on Federal lands until 1980.

Currently, we have approximately 2 million acres of Federal land under lease for geothermal steam. By the end of this year, we anticipate there will be about 750 megawatts of power generated from Federal lands. This is the equivalent to about 10 million barrels of oil per year.

We feel this is quite significant. Federal royalties from the production on Federal lands now exceed $15 million a year. We feel this is also significant.

Total revenues to the Federal Government from all of geothermal leasing and production, that would be rents, royalties, and bonuses, exceed $160 million. I would like to add, this is also shared with the States as provided by law.

Federal lands produce approximately 30 percent of the Geyser's production. Total Geyser production I think would be equivalent to about a 54,000-barrel-per-day oilfield. Again, we think this is quite significant.

The Federal participation of the total production is about 30 percent and we anticipate that royalty from each well, from the Geysers, provides about $100,000 per year. In addition to the Geysers area, we have production in the East Mesa and Heber areas in California; Roosevelt Hot Springs and Cove Fork in Utah; and Desert Peak and Beowawe areas in Nevada.

We anticipate several other areas will go into production in the very near future.

Mr. Chairman, as I indicated, we support enactment of S. 1322. However, we would like to suggest some modifications to clarify and possibly improve this proposed legislation.

First, I would like to go to leases, specifically. The second sentence, section 6(a) as proposed to be amended, could be interpreted as protecting leaseholds that are not within a participating or productive area of the plan. To prevent such an interpretation, the words, "on a lease or under an approved cooperative or unit plant of development or operation in which a lease is included," should be deleted from that sentence.

All leaseholds that are contributing to production; that is, are within a designated participating area within the boundaries of a unit plan, would continue to be protected.

Under section 2 of S. 1322, which would amend section 6(c) of the Geothermal Steam Act, "to require a report from a lessee" should be deleted inasmuch as it would require a report from a lessee that would necessitate a subjective finding by the Department of the Interior as to whether efforts of the lessee to commence production were bona fide. It would be extremely difficult to arrive at a finding that would not be challenged.

Section 6(c)(2), as proposed to be amended, should be further amended to preserve the opportunity lessees now have for lease extensions. This could be accomplished with the following language: "Actual drilling operations commenced on the leasehold or under an approved cooperative unit plan of development that includes a leasehold prior to the end of its primary or extended term, and, unless prevented by safety or technical considerations, are being diligently pursued at that time."

This proposed amended language could require that if drilling does not actually occur on the leasehold, drilling must be accomplished elsewhere pursuant to a plan to which the lease already belongs. It is important to note that the proposed amendment to section 6(c) of the Geothermal Steam Act would not require that a lease actually be included in the plan at the time of drilling. This would result in an unfair windfall to some lessees.

The requirement is that the lease be included in a plan at the time application for the extension is made. Therefore, technically, S. 1322 would allow a well to be drilled, and then at a later date, the lease could join a plan simply to meet requirements to be in a plan at the time application for extension is submitted.

It would also disturb longstanding precedents, in both geothermal and oil and gas programs, that leases be included in a plan prior to the drilling of a well.

We believe section 6(c)(3) as proposed to be amended by S. 1322 should be amended to eliminate the need for the Department of the Interior to review and adjudicate records of lessees to determine whether there has been substantial investment. We suggest that section 6(c)(3) read as follows: "A well has been drilled, to a depth specified by the Secretary, on the leasehold during the primary term of the lease or, if in an extended term, on the leasehold or under an approved cooperative or unit plan of development that includes the leasehold."

This would eliminate the need for the Government to make a subjective determination with regard to whether costs should be allocated to specific lease properties.

We believe that section 3 of S. 1322 is not necessary. This section requires the Secretary to review at 5-year intervals a plan of devel-

opment or operation to eliminate from inclusion in such plans, a lease or part of a lease not regarded as reasonably necessary to cooperative or unit operations under the plan.

The Bureau of Land Management already conducts such reviews of participating areas of production in both geothermal and oil and gas programs and has not encountered difficulties in eliminating nonproducing areas. The 5 years established in S. 1322 would mandate an additional review that we believe is unnecessary, at the current time, for geothermal.

We do review at the end of a 5-year period, with the period commencing at the time the producing area is established; that is, when production does come on line, 5 years from that period. We review the plan; and any lands that are not within the participating areas are eliminated unless there is drilling on the lands not included in the participating area, which then would continue the lease for as long as drilling takes place, providing there are no more than 4 months between the drilling of wells.

In oil and gas it is similar except there we have the 5-year review and there is a 90-day requirement between wells. However, in the oil and gas area we have a second provision that, at the end of 10 years, if there are leases within the unit that are not within the participating area, they will be taken out of the unit at that time. They cannot be further extended by exploration.

There is, however, one provision, I recall, that if 90 percent of the leaseholders with lands in the unit that are not within the participating area agree, there can be a 2-year extension of the leases. This is only for oil and gas.

So from this standpoint, I think that we have had pretty good experience reviewing the units as to the participating areas and eliminating those lands that are not being held by actual drilling or within the production area, itself.

We believe that section 4 of S. 1322 should be deleted. This section would allow extension of all leases in effect on or after July 27, 1984, under certain limitations. This would allow leases that have expired, terminated or been relinquished before the act was passed to be reconsidered for extension after the act has passed.

The problem we foresee here is that some of the areas where leases that have expired, been surrendered or have been terminated may have actually been leased to other people and then we would have third parties involved thus it would be difficult to reinstate these leases.

Also, we believe that if somebody has held the lease for that period of time and has done nothing with it for a 10-year period, we are not certain what they would do if they did have an extension. Possibly somebody else who would want the lease would be more aggressive in developing it. We feel that this provision is probably not necessary.

These are the points that should be addressed in reviewing S. 1322. And, as I say, with these corrections, we would support the bill.

[The prepared statement of Mr. Lawton follows:]

APR 24 1986

STATEMENT OF ROBERT H. LAWTON, DEPUTY ASSISTANT DIRECTOR, ENERGY AND MINERAL RESOURCES, BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR, BEFORE THE SUBCOMMITTEE ON NATURAL RESOURCES DEVELOPMENT AND PRODUCTION, COMMITTEE ON ENERGY AND NATURAL RESOURCES, UNITED STATES SENATE, ON S. 1322, A BILL "TO AMEND THE GEOTHERMAL STEAM ACT OF 1970."

I appreciate the opportunity to appear before the Subcommittee today to discuss the Department of the Interior's position on S. 1322.

S. 1322 would be cited as the "Geothermal Steam Act of 1985."

Section 2 of S. 1322 would amend sections 6(a), (c), and (d) of the Geothermal Steam Act of 1970 to provide that if geothermal steam is produced or utilized in commercial quantities on a lease or under an approved cooperative or unit plan of development or operation in which a lease is included within the 10 year primary term or any administrative extension thereof, the lease would continue for as long as geothermal steam is produced or utilized in commercial quantities. The continuation could not exceed an additional forty years. A geothermal lease in effect on or after July 27, 1984, would be extended for successive five-year periods, for a total of not more than fifteen years, if the lessee has submitted a report detailing bona fide efforts to bring the lease into commercial production, and commenced drilling operations to a depth specified by the Secretary prior to the end of each five-year extension period on such lease or another lease to the benefit of such lease. This would occur where, at the time application is made, both leases are included in an approved cooperative or unit plan of development.

Extensions could also be granted where there are bona fide efforts for commercial production if, in the opinion of the Secretary, substantial investment has been made during the primary term and during each successive five-year extension period on such lease or on another lease to the benefit of such lease. In this case also, when the application for extension is made, both leases must be included in an approved cooperative or unit plan of development.

Section 3 of S. 1322 would amend section 18 of the Geothermal Steam Act by adding a new paragraph requiring that five years after approval of any cooperative or unit plan of development or operation, and every five years thereafter, the Secretary must review each plan and, after notice and opportunity for comment, eliminate from inclusion in such plan any lease or part of a lease not regarded as reasonably necessary to cooperative or unit operations under the plan. A lease or part of a lease so eliminated would be eligible for extension if it separately met the requirements for extension.

Under section 4 of S. 1322, every geothermal lease issued pursuant to the Geothermal Steam Act of 1970 and in effect on or after July 27, 1984, would be eligible for an administrative extension if an application for extension is submitted either within 180 days of enactment of S. 1322 or 60 days prior to the expiration of the primary term of the lease, whichever is later.

We support enactment of S. 1322 if it is amended to address our concerns.

The Geothermal Steam Act presently allows a geothermal lease to continue beyond its ten-year primary term in only two situations: either the lease must be producing, or there must be both a well capable of production and a sales contract for delivery or utilization of the shut-in production, with utilization scheduled to commence within 15 years of the effective date of the lease. S. 1322 would eliminate the requirement that there be a contract for delivery or utilization. We support this change for two reasons. First, with the current oversupply of electrical generating capacity, it is difficult for Federal geothermal lessees to market their production at any price. Second, Federal lessees are at a disadvantage when sales contracts are negotiated inasmuch as they operate under a time constraint. If the lessees do not execute contracts, regardless of how unfavorable the terms may be, they may lose their leases.

S. 1322 also would liberalize the conditions under which geothermal leases could be extended. Currently, a lease can be extended only once, and only if actual drilling operations are being diligently pursued at the time expiration would otherwise occur. S. 1322 would allow up to three successive five-year extensions provided either that drilling had commenced to a depth specified by the Secretary, or that substantial expenditures had been made.

We believe the bill should be modified along these lines:

The second sentence of section 6(a) as proposed to be amended could be interpreted as protecting leaseholds that are not within a participating area (productive lands) of a plan. To prevent such an interpretation, the words "on a lease or under an approved cooperative or unit plan of development or operation in which a lease is included" should be deleted from that sentence. All leaseholds that are contributing to production, that is, are within a designated "participating area" within the boundaries of the unit plan, would continue to be protected.

Section 2 of S. 1322 which would amend section 6(c)(1) of the Geothermal Steam Act to require a report from a lessee should be deleted inasmuch as it would require a report from a lessee that would necessitate a subjective finding by the Department of the Interior as to whether efforts of the lessee to commence production were bona fide. It would be extremely difficult to arrive at findings that would be beyond challenge.

Section 6(c)(2) as proposed to be amended should be amended to preserve the opportunity lessees now have for lease extensions. This could be accomplished with the following language:

"(2) actual drilling operations were commenced on the leasehold, or under an approved cooperative or unit plan of development that includes the leasehold, prior to the end of its primary or extended term and, unless prevented by safety or technical considerations, are being diligently pursued at that time."

This amended language would require that if drilling does not actually occur on the leasehold, drilling must be accomplished elsewhere pursuant to a plan to which the lease already belongs. It is important to note that the proposed amendment to section 6(c) of the Geothermal Steam Act would not require that a lease actually be included in a plan at the time of drilling. This would result in an unfair windfall to such lessees. The requirement is that the lease be included in a plan at the time application for extension is made. Technically, S. 1322 would allow a well to be drilled and then, at a later date, the lease could join a plan simply to meet the requirement to be in a plan at the time an application for extension is submitted. It would also disturb longstanding precedents in both the geothermal, and oil and gas programs that leases be included in a plan prior to the drilling of a well.

We believe section 6(c)(3) as proposed to be amended by S. 1322 should be amended to eliminate the need for the Department of the Interior to review and adjudicate records of lessees to determine whether there has been "substantial investment."

We suggest that Section 6(c)(3) read as follows:

> "(3) a well has been drilled, to a depth specified by the Secretary, on the leasehold during the primary term of the lease or, if in an extended term, on the leasehold or under an approved cooperative or unit plan of development that includes the leasehold."

This would eliminate the need for the government to make subjective determinations with regard to whether costs should be allocated to specific lease properties.

We believe that section 3 of S. 1322 is not necessary. That section requires the Secretary to review, at five-year intervals, the cooperative or unit plan of development or operation to eliminate from inclusion in such plan any lease or part of a lease not regarded as reasonably necessary to cooperative or unit operations under the plan. The Bureau of Land Management already conducts such reviews of participating areas of production in both the geothermal and oil and gas programs and has not encountered difficulties in eliminating non-producing acreage. The five-year interval established in S. 1322 would mandate an additional review that we believe to be unnecessary.

Section 4 of S. 1322 would allow extensions for all leases in effect on or after July 27, 1984, under certain limitations. This would allow lessees whose leases have expired, terminated, or been relinquished between July 27, 1984, and the date of enactment of S. 1322 to apply for an extension. Any extension granted under section 4 should be limited to leases in effect on or after enactment of S. 1322. There is no public benefit to be derived from retroactive inclusion of leases which may no longer be in effect. In some instances it is possible that the land has been leased again to a new lessee. It could also prove to be an administrative burden to adjudicate retroactive applications for extension during these times of fiscal restraint. Therefore, we recommend section 4 be deleted from the bill.

This concludes my statement. I will be pleased to answer questions.

Senator HECHT. All right, while you were making your different proposals, I was asking staff about any objection and they informed me—we have civil rules asking you to submit your statements 24 hours in advance so we can go over your statement and cross-examine you. But you did not submit that.

Mr. LAWTON. I am told that the prepared statement was not here in a timely manner and I do not know why. I am sorry, sir.

Senator HECHT. In the future, would you abide by the rules so we can address you with questions? We will have to check into this and there will be written questions for you and we will ask you to submit your answers for the record.

Mr. LAWTON. Fine, we will be glad to do that. And, again, I am sorry my testimony was not here on time.

Senator HECHT. Thank you. It is very necessary so we can ask you—and staff has not had a chance to look over the changes that you have asked for.

Mr. LAWTON. Thank you.

Senator HECHT. Thank you. The next panel is Joseph Wilson, Domenic Falcone, and Kenneth Nemzer.

If I could ask you gentlemen to try and keep your remarks under 10 minutes, and your full statement will be a matter of record.

Mr. Joseph Wilson.

STATEMENT OF JOSEPH L. WILSON, VICE PRESIDENT AND GENERAL REPRESENTATIVE, UNOCAL GEOTHERMAL DIVISION

Mr. WILSON. Thank you, Senator. I am here today to support and urge the rapid enactment of S. 1322, which will promote the development of geothermal energy.

S. 1322 was introduced on June 19, 1985, by you, Senator. It was a significant piece of legislation last year, and with the current energy situation, it has become increasingly important.

Geothermal energy is a vital, alternative resource which has been reeling from the so-called energy glut in recent months. The cost of exploration and drilling, coupled with falling prices, has placed the industry in a near noncompetitive position in the search for new resources.

We believe the current energy situation is temporary and that demand and price for energy will rise in the future thus reigniting the need for alternative energy, in general, and geothermal in particular.

Therefore, it is imperative that the search for geothermal resources continue during this downward swing in industry activity as more and more companies are going out of business or reducing or abandoning their geothermal activities. One of the causes of the reduced geothermal effort, other than the above-mentioned economic condition, is a section of the Geothermal Act of 1970, which required a lessee to meet certain conditions at the expiration of the primary term of a Federal geothermal lease, or the lease will be canceled.

These include a well producing or capable of producing geothermal steam in commercial quantities, and a bona fide sale of such resource for delivery to or utilization by a facility or facilities not

yet installed but scheduled for installation not later than 15 years from the date of commencement of the primary term.

The above conditions impose both a hardship and a deterrent to exploration and production of geothermal resources in today's market.

Geothermal operators are faced with public and private utilities that are not interested in negotiating new sales contracts. The utility industry in the Western States generally has a surplus of power and seems unwilling to make capital investments for additional generating capacity or to expand existing transmission capacity.

The industry is most certainly not interested in new transmission lines to remote areas of the West where geothermal resources are most likely to be discovered.

This tends to discourage exploration for geothermal resources since geologic success could mean economic failure. That is, if an operator inducted huge sums of capital in exploration and made a discovery but was unable to market the resource, his lease would terminate and the investment would be lost.

S. 1322 eliminates many of the aforementioned problems. It allows a lessee to extend a primary term for successive 5-year periods, but not to exceed 15 years, if the lessee has submitted a report to the Secretary detailing bona fide efforts to bring the lease or unit into commercial production, given the then-current economic conditions.

The lessee is also required to drill a well prior to the end of the primary term and prior to the end of each 5-year extension, or, in the opinion of the Secretary, substantial investments have been made by the lessee during the primary term in each 5-year extension.

These provisions will allow a lessee to continue to explore for new fields, even though a ready market may not be available. This, in turn, would place in the Nation's inventory of energy an alternative source ready for utilization when the next energy shortage occurs.

I would also like to take just one short moment to comment on the gentleman from the Department of the Interior. Obviously, I have not had an opportunity to analyze all of his remarks. It did seem to me that he was addressing those leases involved in a unit only, where he felt that many of these requirements would be unnecessary because of the requirement that the Department makes as a matter of fact on the various unit agreements that are entered into between the operators and the government.

It wouldn't affect an individual lease, and certainly not all leases are parts of Federal units. In fact, the units are in a minority as to the total acreage under lease. I think that your bill is well taken and structured to cover both the unit and the lease, particularly the lease.

We, or at least my company, has no objections to filing plans with the Secretary to demonstrate that bona fide efforts have been made, that diligent expenditures have been made—not necessarily having to drill a well because wells may be precluded from being drilled during a particular period of time because of environmental constraints or whatever. And there are other expenditures that the

Department has made on an individual lease basis that could count—geophysical activities, various electric surveys, et cetera.

So, I think that the substantial investment, beyond just drilling a well is very important, both for a lease and for a unit, and certainly if the Department can review plans that must be submitted under units, I cannot see a problem for a lessee or an operator submitting a similar type of plan on an individual lease.

Thank you, Senator, for allowing me to testify today, sir.

[The prepared statement of Mr. Wilson follows:]

STATEMENT OF JOSEPH L. WILSON

VICE PRESIDENT AND GENERAL REPRESENTATIVE

UNOCAL GEOTHERMAL DIVISION

BEFORE THE

SENATE SUBCOMMITTEE ON NATURAL RESOURCES DEVELOPMENT AND PRODUCTION

OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES

WASHINGTON, D.C.

APRIL 24, 1986

My name is Joe Wilson. I am Vice President and General Representative of the Unocal Geothermal Division. I am here today to support and urge the rapid enactment of S. 1322 which will promote the development of geothermal energy.

Before presenting the reasons for supporting this legislation, I would like to present a few facts about the potential of geothermal energy, the contributions it can make to our Nation's energy requirements, and Unocal's efforts in this regard.

On a nationwide scale, experts believe that there is a geological opportunity to produce enough geothermal energy to supply 20,000 megawatts (MW) of generating capacity in the next two decades. That is the equivalent of about 700,000 barrels of oil per day, or 8.5 percent of today's crude oil production in the United States.

As technological advances are made, there is the potential for significantly increasing this capacity in succeeding decades. For instance, Unocal is the principal operator of the Nation's major geothermal development at The Geysers in Sonoma and Lake Counties, California, the largest geothermal project in the world. Its development began in 1957, and, although initial developments were slow, today enough steam is produced to power a generating capacity of approximately 1,800 MW. This is sufficient to supply all the electrical requirements of a typical city of almost two million people. Such generating capacity will result in a savings of about 19 million barrels of low sulphur fuel oil per year, which will not be needed to generate electricity. Continued expansion is taking place at The Geysers field and ultimate capacity is now estimated to be a little over 2,000 MW.

Unocal has long been a leader in the geothermal industry. We are responsible for approximately 1,800 MW of generating capacity worldwide and we are planning to add another 300 MW of which the reserves have been confirmed. We are actively engaged in other projects here in the United States and abroad.

In the United States at the Salton Sea, in the Imperial Valley of southeastern California, Unocal and Southern California Edison have a project which produces geothermal

energy from the Valley's highly saline geothermal fluids to power a 10 MW generating plant. This plant is the first in a series which could eventually supply geothermal energy to generate several thousand MW of power for Southern California.

The Imperial Valley has often been called the Saudi Arabia of the world's geothermal resources because of its vast potential. Success with the initial Salton Sea endeavor will augur well for a stronger geothermal role in electrical generation in this fast-growing populous section of the United States.

In addition, we currently have active or planned exploration activity elsewhere in California and in other western states. Unocal historically has a strong dedication to the development of geothermal energy and we are committed to its future growth.

We support passage of S. 1322 which was introduced on June 19, 1985 by Senator Hecht. It was a significant piece of legislation last year and with the current energy situation, it has become increasingly important. The geothermal industry is a vital alternative energy resource which has been reeling from the so-called energy glut in recent months. The cost of exploration and drilling coupled with falling prices has placed the industry in a near noncompetitive position in the search for new resources.

We believe the current energy situation is temporary and that demand and price for energy will rise in the future, thus re-igniting the need for alternative energy in general and geothermal in particular. Therefore, it is imperative that the search for geothermal resources continue during this downward swing in industry activity, as more and more companies are going out of business or reducing or abandoning their geothermal activities.

One of the causes of the reduced geothermal effort other than the above-mentioned economic condition, is a section in the Geothermal Steam Act of 1970, which requires a lessee to meet certain conditions at the expiration date of the primary term of a Federal geothermal lease or the lease will be cancelled. These conditions are as follows:

1. A well producing or capable of producing geothermal steam in commercial quantities.

2. A bona fide sale of such geothermal steam for delivery to or utilization by a facility or facilities not yet installed, but scheduled for installation not later than 15 years from the date of commencement of the primary term of the lease.

The above conditions impose both a hardship and a deterrent to exploration and production of geothermal resources in today's market place. Geothermal operators are faced with public and private utilities that are not interested in negotiating new sales contracts. The utility industry in the western states generally has a surplus of power and seems unwilling to make capital investments for additional generating capacity or to expand existing transmission capacity. The industry is most certainly not interested in new transmission lines to remote areas of the west where geothermal resources are most likely to be discovered.

This tends to discourage exploration for geothermal resources since geologic success could be deemed an economic failure. That is, if an operator invested huge sums of capital in exploration and made a discovery, but was unable to market the resource, his lease would terminate and the investment would be lost.

S. 1322 eliminates many of the aforementioned problems. It allows a lessee to extend the primary term for successive five-year periods, but not to exceed 15 years, if the lessee has submitted a report to the Secretary detailing a bona fide effort to bring the lease or unit into commercial production given the then current economic conditions. The lessee is

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also required to drill a well prior to the end of the primary term and prior to the end of each five-year extension or, in the opinion of the Secretary, substantial investments have been made by the lessee during the primary term and each five-year extension.

These provisions will allow a lessee to continue to explore for new fields even though a ready market may not be available. This in turn would place in the Nation's inventory of energy an alternative source ready for utilization when the next energy shortage occurs.

Thank you for the opportunity to appear before your committee.

Senator HECHT. Thank you, very much. Will each of the panelists take each of the suggestions made by Mr. Lawton, and see how it affects each individual and submit for the record the results.

Mr. Falcone.

STATEMENT OF DOMENIC J. FALCONE, EXECUTIVE VICE PRESIDENT, GEOTHERMAL RESOURCES INTERNATIONAL, INC.

Mr. FALCONE. Good morning. Thank you for inviting myself and others from our industry here to testify this morning and positively recommend the passage of S. 1322.

We obviously wish to offer you our support and also our assistance, and along those lines, I do believe that the first speaker here today made some very positive comments about the contribution that the geothermal industry has made to the Nation's need for alternative energy, as well as the Treasury's coffers as far as royalties and leasehold payments are concerned. I think those are very positive comments, and I think Mr. Wilson also made some very positive comments about the state of the industry at the present time and the need for this particular piece of legislation, especially as to leases on which some operators could very well have determined there is a resource and have spent a lot of money doing so, but find that there is no marketplace in which to sell the resource.

That is a very, very key issue at the present time.

The first gentleman also spoke and made some comments and suggestions on the bill. I also would like to have the opportunity to respond in writing to some of those thoughts, primarily the one having to do with the leases not in the unit, and the other one in which he suggested deleting section 4.

I think it is important to remember that section 4 does indeed still require that the operator meet the act in order to maintain the leases. So, it isn't like suddenly you are gratuitously going to receive this extension. We still have to come in and demonstrate why it is we are entitled to continue the lease.

This is very important for our company specifically because we were one of the first companies to get a geothermal steam lease and we have spent millions of dollars on some properties, on exploration, and have yet to be able to find a marketplace for some of the properties on which we have determined, in fact, there is resource.

We don't feel as though a lease should be taken away from us at this point in time because we can't find a marketplace when in fact we have demonstrated far beyond diligent exploration expenditures, for instance, that we dealt in good faith in order to try to determine where the resource is to begin with.

So, I think, as I said before, your legislation at this point in time is very timely, very important for the industry which right now does need a longer look because we are in a situation right now where there is not a great utility demand for alternative energy. If these leases are taken away from the companies that have indeed spent the time and the effort on them—and I am not totally convinced they would be put back up for bid if and when the turn around comes again and the utilities are looking for electricity all over again.

It takes a long time to implement legislation. It takes a long time—it took a long time to get the leases drafted to begin with, and I think that if you took the leases away and then put them back up for bid again, who knows what would be the situation when, in fact, you already have interested players out there who have done things to prove that they have a distinct interest in alternate energy in the country.

I would like to make one comment concerning the parks issue. We think, of course, that there is plenty of legislation locally, statewide, and federally, that will protect our national parks, and we do not feel as though your particular bill at this point in time should be bogged down and prevent extensions of these important leases to the industry because of the parks issue.

It is something that this industry, just like every other industry, has and can deal with. The mechanisms are already in place to make sure that nothing bad happens out there.

To slow down the passage of this because of the parks matter, I think would be inappropriate at this point in time. Your bill is neat and it is simple and it does something very important for an industry that needs help right now, and that is the primary reason why we feel as though fast passage of this piece of legislation deserves our support and we offer it to you, as I suggested earlier.

I do have one other page of some comments on the legislation itself, which I have already submitted, and would ask that you take it for the record as far as this testimony is concerned.

Senator HECHT. Thank you. It will become part of the record and I will have the staff analyze it and we will be back in contact with you.

[The prepared statement of Mr. Falcone follows:]

TESTIMONY OF DOMENIC J. FALCONE
PRESENTED TO THE SUBCOMMITTEE ON NATURAL RESOURCES
DEVELOPMENT OF THE COMMITTEE ON ENERGY AND NATURAL
RESOURCES - APRIL 24, 1986

Good morning, I am Domenic J. Falcone, Executive Vice President of Geothermal Resources International, Inc., a moderate sized, independent, geothermal exploration and development company. I am also involved in various capacities on a number of Boards of Directors of various associations which are affiliated with the geothermal industry.

Our Company has been involved in geothermal exploration and development, principally in The Geysers area of California, since 1966 and was one of the first companies to be granted a federal geothermal lease in California as prescribed by the Geothermal Steam Act of 1970. Since that original act, we, and other companies, have expanded our geothermal activities into the States of Nevada, Oregon, New Mexico, Utah, and others. We have participated in exploration programs on federal leaseholds in each one of these states, and by doing so have either proven or disproven the resource value of government owned minerals. As such, we are one of the more active companies in what is becoming a shrinking business activity. This shrinkage is being created by the current electricity generation surplus and significantly reduced oil and gas prices.

During the time immediately after the implementation of the 1970 Act, primarily fueled by the "energy crisis", the geothermal business became a very viable energy industry. A great deal of drilling activity took place because utilities, representing the ultimate market for geothermal steam, had a need to secure a predictable domestic source of fuel for electricity generation. The good news for the utilities was that even at low oil and gas prices geothermal fuel was still a more competitive fuel alternative.

In order to properly assess the significance of this current proposed amendment to the 1970 Act, it is important to realize that from initial execution of a lease to the first sale of resource, provided everything goes reasonably well, it could take an average of seven years to be in production. That not only means that development, by making large capital expenditures, of the resource must be successful but also that a Steam Sale Contract has been entered into with an end-user.

If this bill is not passed those of us who have explored and discovered geothermal resources and suddenly had the bottom fall out of the market place would have spent millions of dollars for naught because within a very short period of time our potential market has evaporated. This is one of the many reasons why most leases with private landowners are negotiated in an effort to get a twenty-year lease term.

As you analyze this bill and its effects, please remember that even a sudden turnaround in the market place does the geothermal industry little good since our market is generally

site specific due to the fact that utilities have dedicated limited territories and steam can only be piped over short distances.

The geothermal industry needs time for the next turnaround and cancellation of existing leases, on which considerable evaluation work has been done, would not only be very discouraging but would not be in the best interests of our nation. History has proven that the leasing of federal or even state geothermal rights does not come about in short time frames. It is better to have the leases in the control of those who have spent time and money evaluating these properties than to cancel those leases and delay the development of this excellent alternative resource.

Finally, it is important to remember that the Treasury receives royalty payments from sales of geothermal resources from these leases. By not allowing appropriate extensions, or at least extensions which are in tune with current economic and demand conditions, we will be putting ourselves again in the position of being "have nots" when the energy need arises.

For all of the reasons set forth above, I request this Subcommittee to favorably recommend passage of S.1322. Thank you.

With respect to specific provisions of S. 1322, Geothermal Resources International, Inc. would make the following comments:

1. Sec. 2(c)(1). regarding submission of a report "detailing bona fide efforts" to bring a lease into commercial production. To ensure that this phrase is properly interpreted it would seem appropriate to include in the Committee's report a discussion as to what constitutes such bona fide efforts.

Items relevant to such "efforts" could, among other things, include: performance and timely monetary expenditures under the individual lease or unit plan, diligent efforts to secure a steam and/or associated geothermal resources sales contract, the initiation of the permitting or application process for the acquisition of transmission right-of-ways and plant sites and the obtaining of bids for the design, feasibility and construction of such transmission lines and power plants, taking into consideration the then current economic conditions facing the industry.

2. Sec. 2(d). regarding completion of wells capable of producing geothermal steam in "paying quantities."

The term "paying quantities" should be clarified to mean production in quantities sufficient to yield a return in excess of drilling, development and operating costs. The substitution of this term for "commercial quantities" (as the latter is used in the Act of 1970, the Federal lease form and Title 43 CFR) would thereby make geothermal leasing consistent with the generally accepted language that is used in the oil and gas sector.

3. Sec. 4. regarding filing a request, within certain time frames, for an extension.

(a) It may be necessary to further clarify that this section also applies to an expired lease, assuming that lease, or lease within a unit, had met the criteria under this section, within 180 days of enactment of this Act.

(b) Secondly, if a leaseholder has already received an extension (to 12/31/86) under section 319 of Public Law 98-473 would the date of that extension be used to start the 5-year extension period; the original lease expiration date; or, the 12/31/86 date? Since the original lease expiration date varies widely depending on the individual lease involved, it would be more easily administered by the BLM and fairer to all operators to use the 12/31/86 date.

Senator HECHT. Mr. Nemzer.

STATEMENT OF KENNETH PRESS NEMZER, CHAIRMAN, GEOTHERMAL RESOURCES ASSOCIATION

Mr. NEMZER. Thank you, Senator. My name is Kenneth Nemzer. I am the chairman of the Geothermal Resources Association, which is a trade group that includes the major developers of geothermal power; has companies of all kinds, from divisions of larger companies, such as Mr. Wilson's company, to newer companies, such as my own, California Energy Co.

You might recall that we are doing the development at China Lake on the Naval Weapons Center. We also have projects in the Northwest in frontier areas.

Let me depart for a while from my written statement to say, Senator, that I admire and appreciate your very practical approach to this legislation in particular, to your insistence on identifying real and current needs, not addressing unripe needs, anticipated possible needs, such as those of the national parks which can be addressed when they arise, if they arise.

Right now we have some genuine problems, problems that need to be addressed in order for this very important industry, the geothermal industry to go forward, and it is a credit to the Congress if it will address these narrow issues and get us some legislation that is workable.

It is important to note that the legislation is vital and immediate as a need not only for those companies that have leases that will expire very soon, but even for those that have leases that will not expire for a number of years. The reason is that all of the companies in the Geothermal Resource Association in the industry, whether large or small, have to respond to investors and investors have to make investment decisions at all times.

Those investment decisions in the geothermal field have to be long-range, and 10 years is not a long time. They have to know that 10 years down the road those leases are not going to disappear. They are putting their money in this industry knowing that the geothermal resource is not going to disappear, but leases are made by man and, if they are likely to disappear after 10 years, you are not going to get the investment that you need.

As you know very well, being familiar as you are with the geothermal industry, Senator, geothermal is different from other resources in that it has to be used on the spot. You can't transport it. You can't produce a little bit of it, take it and sell it. None of the investors get any return on their investment until an entire project is done. Neither the investors in the lease, the investors in the exploration drilling, the development drilling nor the powerplant construction gets any return at all until the entire project is completed.

So that it is a very different sort of investment and a much more long-range sort of investment than in other resources. And you will not get the investment unless the investor, again, can look to the other stages and can know, or be pretty sure that at the end of the line the lease will still be there when power is ready to be produced.

As Mr. Falcone pointed out, the ability to produce power at any given time is dependent upon market condition. Market conditions are not particularly good now in some areas. The Northwest has more energy than it can use; Nevada has as much as it can use, but in the future both areas will need power. In the meantime, transmission lines are planned and we hope will be built to take power from the Northwest and from Nevada to California, where the need is greater.

So, we must look to the long term and to look to the long term in terms of leases, one needs to have a way to extend the leases beyond the 10 years. This bill is fair. It is not for slaggards. One cannot take the lease, do nothing on it and expect it to be extended under this bill.

Let me make a remark about the suggestion of the Department of the Interior, having to do with unitization. I would suggest that it might be looking at too many problems at once if one is going to tie the extension to unitization, as is the thrust of the gentleman from the Department of the Interior.

There are various reasons for and against a unitization. My own company has several units and thinks it is a good program. But if one ties the availability of an extension to a unit, and especially to having a unit at the early stage, as is suggested by the Interior Department, then what one does is to put conditions, qualifications on that road from investment to production.

The more qualifications, the more conditions one puts on, the more complicated you make it, the less ready an investor is to put his money down. I think, Senator, that that would be a mistake.

What you need is a simple bill which, in fairness, requires investment, requirements investment on the particular project and empowers the Department of the Interior to look at the investment and make sure it is a fair one and a good one but which does not impose special and unyielding conditions.

I would point out as a last point that there are other groups who are also muddying the waters as to this direct path from investment to realization of production. The Department of the Interior itself has been sued recently by the National Wildlife Federation. I won't address the merits of that suit, except to say that since the suit does not focus in on a particular problem, it has thrown its nets very wide and has ended and appears to be blocking some geothermal projects totally unrelated to their purpose, which is environmental protection.

There are some projects, particularly near the Navy project at China Lake which are being blocked because some land was withdrawn, not for environmental purposes, but withdrawn for weapons-testing purposes, and put back into leasing—now it is blocked by this lawsuit against the Department of the Interior.

We don't even know yet how many other areas, including perhaps some geothermal areas which are affected by this process of throwing nets too wide, focusing not on a particular problem.

Senator, I appreciate the opportunity to speak here, and the statement has been submitted for the record, and we would like the opportunity to submit further remarks in response to other things said here.

[The prepared statement of Mr. Nemzer follows:]

STATEMENT

of

KENNETH PRESS NEMZER

CHAIRMAN OF THE GEOTHERMAL RESOURCES ASSOCIATION

Before the Subcommittee on Energy Production

U.S. Senate on Energy and Natural Resources

in support of

S. 1322

Amendment to the Geothermal Steam Act of 1970

April 24, 1986

STATEMENT OF KENNETH PRESS NEMZER
CHAIRMAN OF THE GEOTHERMAL RESOURCES ASSOCIATION

My name is Kenneth Press Nemzer. I am the chairman of the Geothermal Resources Association, a trade group whose members include the major developers of geothermal power. I am also the General Counsel for California Energy Company, a company engaged exclusively in geothermal work, both in resource development and in power plant construction. California Energy Company has projects at the Naval Weapon Center, China Lake, California on which a plant is being built and a second contracted for; and has a large number of federal leases in the Northwest at the early exploration stage.

1. LEGISLATION TO EXTEND LEASES IS AN IMMEDIATE NEED FOR GEOTHERMAL INVESTORS. S. 1322 provides a workable system for extending federal leases beyond their 10-year primary term provided that, if not producing, the leases have been the subject of substantial work and investment. Some members of the Geothermal Resources Association have leases in imminent danger of expiring, leases in areas which for economic reasons are not ready to have power plants built. The urgency of their need for an extension is evident. Other companies, including my own, have leases with most of their ten year terms left. They too have an immediate need for this legislation. The reasons for the need center around the type of investment decision that needs to be made in the geothermal industry. Peculiarities of this industry make short term leases especially unworkable, and make ten year leases, in geothermal schedules, short term.

2. GEOTHERMAL DEVELOPMENT TAKES PLACE IN STAGES, EACH DEPENDENT ON THE OTHER STAGES. Geothermal is partly an extractive industry, in the sense that geothermal developers explore for, drill for and extract a resource. But unlike other resources, a geothermal resource cannot be transported; it must be used where produced. The one-site character can be an environmentalist's dream, since one need only avoid environmental hazards in that one spot; but that character can be an investor's nightmare. Geothermal production has several distinct operations and requires several distinct investments, but no investor realizes a penny of production income until all the steps have been financed, prepared, carried out and made successful.

   The investor in geothermal resources, therefore, must do what investors least like to do: to put his money, in large sums, to ventures where return depends on other investors and on the circumstances of later years. That time factor is our focus here. The investor who finances the leasing of land from the Government and the investor who finances geothermal exploration on that land have to rely not only on the developer's ability to finance and complete the project all the way through exploration and development of the resource, plant-siting, plant construction, transmission line construction and finally sale of power; he must also rely on circumstances at the end of that road being propitious for selling power.

At every step along the way it has to appear to the other investors that circumstances will be proper for sale at the end, or the chain will be broken and the earlier investments made futile.

3. THOUGH MOST EFFICIENT IN THE LONG TERM, GEOTHERMAL DEVELOPMENT HAS HIGH INITIAL COSTS AND MANY SOURCES OF DELAY. Geothermal projects are costly at the outset. A production-size well is normally budgeted at upwards of a million dollars, and can end up costing three to four million. Temperature gradient holes typically cost one to three hundred thousand dollars. Plants cost one to two million dollars per megawatt capacity. All these steps must be integrated into a long term program, which means steep administrative costs. In short, the capital expenses to get a geothermal project and the power production set up are substantial. Even though geothermal energy is cost effective when successful, it is efficient because of the long lasting nature of the resource; in the short run it is costly.

   Every risk factor over the lifetime of a geothermal project potentially deters investment at that stage, and also deters investment at every later stage in the process. The earlier the investment, the greater the risk, not only because the resource is unproven at first but also because more years and more opportunities for delay and adversity lie between the investment and the return.

   Among the causes of delay are the following:

   a) The national and regional energy situation, that which has now produced excess energy availability in a few areas, such as the Northwest.

   b) The need for transmission capacity, sometimes involving construction of long power lines to areas of heavy power use. Examples are proposed new interties to California from the Northwest and Nevada.

   c) Environmental delays. These can include not only environmental studies and preparation of environmental documents; in areas new to geothermal development, delays can occur as administrative agencies gear up to handle the special technology.

4. THE UNACCEPTABLE INVESTMENT RISK: LOSING THE LEASE. Senate Bill 1322 will not cure or do away with most of the adversities faced by a geothermal investor. But it can assist with one very important risk: the risk of a lease expiring before power is produced.

   Despite adversity, some investors are willing to push their money into the quest for geothermal projects, even in areas which will not need power for some time. But they will not do so if there is significant risk that, before their quest is finished, the resource will be snatched away. Of all the risks that is the hardest to swallow. Geothermal investors are of necessity long term investors, willing to let their money work for long years before it benefits them. They are encouraged by the knowledge that geothermal resources, so far as we can discover, will not soon physically and geologically dissipate; the resources are in place to stay. Leases, on the other hand, are human creations; and if the leases might dissipate unjustly, the investor will take his coin elsewhere.

The question of lease duration troubles investors at each stage of development. No one wants to fund geological and geochemical research, test holes, production sized holes, wells, gathering systems, turbines, power plants, transmission lines, or any other step if the duration of the lease is in doubt.

5. S 1322 HAS PROTECTIONS FOR THE GOVERNMENT. S 1322 does not, of course, make the lease endure under all circumstances. Responsibilities are laid upon the investor and developer to keep investing and working. That is not cheap or easy; but in principle it is fair. The provisions of your bill assure that work is done whenever timing and economics justify it. S 1322 is not a bill for slackers or free-loaders.

6. NO FACTS APPEAR TO MAKE S. 1322 UNDESIRABLE. Given these facts, the converse question must be asked: Are any values served by not having the extension provisions of S 1322? With other types of resources it is important for the Government, as other landowners, to have strict time caps on non-productive leases. The land does the country no good if it lies unused; and in the case of other resources, one might think that a developer who has not produced after ten years will not produce. But that is not so with geothermal. The circumstances here described, requiring enormous patience on the part of investor and a confluence of circumstances favoring each part of development, mean that one who has held the land for ten years is still probably the one to develop it thereafter. If the ten year holder has devoted significant work, that developer is the one to be relied upon after the ten year period.

   Another reason given to terminate some leases is to free the land to other users. But geothermal development is compatible with other uses; and leases need not be curtailed to accomplish multi-use goals.

   If a lease were terminated after ten years, any succeeding lessee would face the same economic circumstances which, by hypothesis, have delayed development to that date. Moreover, a new lessee would not have the investment already in it. It would not have investors telephoning, scowling at the company's financial reports, showing the expressions of impatience that investors always do when their money is in the ground and no return has come. It is that very impatience, from the investors whose indulgence made the project possible, that gives rise to the likelihood that the project will be completed. If the investors' optimism and patience ever turned to apathy, at that time the investors would no longer stand for the rental to be paid, and the property would be abandoned. If abandoned there is no need for a termination date.

7. CONCLUSION. We ask you to focus on the premise that geothermal investors, given the chance and given the conditionally renewable lease, will make projects work. That is in the history of the geothermal industry: pioneers who invest and work year after year, sometimes a decade and more, and finally produce this clean, efficient, domestic resource. It is for those investors that the Geothermal Resources Association asks you to enact S. 1322.

   Thank you.

Senator HECHT. Thank all of you for appearing. I am from Las Vegas, NV, which sometimes people call the entertainment capital of the world. There is a comedian that comes out there—I think his name is Rodney Dangerfield, and he always says, "I don't get no respect."

You gentlemen have put forth huge sums of money, and a lot of other people, knowing full well that it is going to be years and years down the line when you will, if ever, get the first dollar of profit, but yet you continue to do that for the good of the country, to make us more energy independent, and I think you must be protected. That is the whole purpose of this legislation, to take care of people like yourselves who are not afraid to make an investment, because America does need the energy.

When I introduced the bill some time ago, we were not in the critical position that we are today. And every day it seems to get worse because probably we are more energy-dependent on the Middle East than we have ever been in the last 10 or 20 years.

So, I commend all of your efforts on that behalf, and it was because of that that this legislation was introduced.

I have a few questions here. One of the pressing problems my bill attempts to address is the one associated with having a producing or producible well, with no contract for the sale of the energy from such wells. Many companies are facing the prospect of having to relinquish their leases because of this. Is this a serious problem for any of you?

Mr. WILSON. It certainly is, I think, for the entire industry, Senator. And as you have noted, it has become increasingly important in the last year or so. Prior to the so-called energy glut, we were able to negotiate contracts, have a contract in place, and be able to meet all the qualifications of the original scheme. But with today's situation, that is just nigh impossible. As I mentioned earlier, the utility industry is at the moment, for the short period of time, has an overabundance of producing capacity. That is going to be short term and we know that.

So, as we mentioned earlier, what do you do now? You have a lease that you may have paid many millions of dollars for in a Federal competitive sale. You want to drill a well, but if you drill the well, there isn't a market. If you don't have a market at the end of 10 years, your lease is terminated.

So, you are very foresighted in your bill, because when you introduced it last year, it was just beginning to emerge, over the horizon, of what our problems were going to be. And, boy, they are here now, and I just can't see—if this bill isn't enacted, I can't see but a very, very, very few geothermal companies being in business 1 year from now, unless they have some income from earlier production that can sustain them through that period. A company without income is just like a service company in today's industry; if you can't keep your drilling rigs busy, you can't survive very long because there isn't any other income stream.

Mr. FALCONE. Specifically, we have property in Dixie Valley, NV, for instance, on which we have production, but we also happen to have contiguous leases to that particular lease that has the production. We could possibly lose the contiguous leases at this point in time because out of Dixie Valley, only 50 megawatts' worth of

market exists and that additional leasehold property that we have, which we feel very competent has the same resource on it that is in the next section, has not been drilled up with a marketplace, yet.

So, we do have a serious problem there. We have some other areas outside Reno, in which there is production contiguous to our properties, but nowhere to go as far as marketplace is concerned. So, our company does have some specific concerns, yes.

Senator HECHT. Thank you. And if we don't take care of these different leases, no one in the future is going to put down their money, because if we turn our back on the people who have put their money down, no one will want to take the risk in the future. I am a businessman, so I understand that rationale.

Mr. FALCONE. And being from Las Vegas, you also understand risks.

Senator HECHT. There is always going to be risk. There is no sure thing, but the people who do put up the risk capital should be rewarded. That is my opinion and always has been for 35 years; not just when I came to the U.S. Senate.

Mr. WILSON. We certainly concur with that.

Senator HECHT. And provided with tax incentives.

Do you feel that three 5-year successive extensions provided for in my bill will more adequately provide an opportunity for geothermal developers to formulate an orderly plan of development for their respective leaseholds? Will such extensions provide a willingness on the part of financial institutions to look more favorably upon geothermal ventures knowing that lessees have security of tenure and that the lease term and conditions are secure?

Before you answer, Senator Wallop has just walked in. Do you have an opening statement?

Senator WALLOP. I do not, Mr. Chairman. I just stopped by to show my interest in the subject. I feel there is a problem.

Senator HECHT. No statement then. Thank you.

Do any of you care to address that question?

Mr. FALCONE. I would like to suggest that I think your extensions are fair. They keep the feet to the fire of the lessee and I think it is a good benchmark, that you should keep people continuing to march to the correct set of circumstances in order to make the profit that they are in the business for. And I think that those types of extensions will make things more secure for development purposes.

Mr. WILSON. I certainly concur in that. I think the key part of your bill is that the operator, the developer must continue to work diligently, the development of the property, seeking a contract, and all these other things, and has to demonstrate that for the Secretary.

It is not a giveaway. It is not a preferential right, even when it is being given. The work requirements are there. They are fair. They are reasonable and I think well thought out.

Mr. NEMZER. Senator, your question is very perceptive. The long-range planning that developers and their bankers and their financial supporters need to do in the geothermal business has to be long range. It has to include contingencies and to address 25 years as a possible length of time for developing an area is not unrealis-

tic. It in fact is very realistic and extensions such as this are very important.

I also, by the way, since Senator Wallop is here, express the feeling of the industry, that we are very appreciative, Senator, for all that you have done for energy, for alternative energy and particularly for geothermal. You and Senator Hecht have both been very much noticed and very much appreciated by the geothermal industry.

Senator WALLOP. Thank you.

Senator HECHT. Section 2(d) of my bill, among other things, provides that production of utilization shall be deemed to include the completion of a well capable of producing geothermal steam in paying quantities. Do you think that my bill should specifically define the terms "paying quantities?"

Mr. FALCONE. I think maybe Mr. Wilson probably has a better chance of speaking to this one, but I will take a shot at it. I think the paying quantities definition has at least some standard at this point in time, because that is the same terminology that is used in the oil and gas leases. So from that point of view, we are not being prejudiced one way or the other.

We have a benchmark which can be used. If you would like to, certainly we would be happy to provide a better definition of paying quantities that is more specific.

Senator WALLOP. I would have to express my own feeling that the more specific such things become in legislation, the more threat they generally represent to the people that are subject to the interpretations.

Mr. WILSON. You are absolutely right.

Senator WALLOP. My own feelings on those is that the less said the better, because you can't make a certain demonstration—unless you define it so broadly as to make it meaningless. In that case, you are probably better off out of it.

Mr. NEMZER. It seems to me, Senator, that the regulations which the Department of the Interior presumably will promulgate, to interpret phrases of that sort, we would hope, would take care of the problem. If they do not, then at that point, we could come back and ask for an amendment to adjust the definition.

Mr. WILSON. Senator, I don't think that there is any need to even address it, because those words are currently in the 1970 act, and certainly, the wells have been completed, that have been classified as productive—I cannot think of an instant where an operator or the Department of the Interior had a disagreement as to whether or not a well was capable of commercial production.

Senator WALLOP. With the decision by the Department to raise the statewide limitation on Federal leases that can be held by any one company, from the previous limit of 20,480 acres to 51,200, as provided in the Geothermal Act of 1970, do you feel that there continues to be a need for even large lease acreages? And, if so, you might expand on that a little.

Mr. WILSON. I have always been an advocate of greater chargeability for geothermal. We were delighted to accept the first hurdle, when we were able to increase it from 20,400 to 51,200, this past year through the functions of the 1970 act. When you consider geothermal, up to oil and gas—well, oil and gas has 246,080 acres

of chargeability and has had that large number for so many years I can't remember when it was first enacted—and then you look at geothermal, at an emerging industry that was earlier saddled with just the 20,000 acres, and now we finally got a breather with the 51,000, and when you consider that the Department of the Interior has classified over 100 million acres as areas valuable prospectively, certainly there is plenty of land for anyone that wants to get into the industry. And I would certainly second the opportunity to increase that to 100,000 or more. We would be happy with any higher figure.

Mr. NEMZER. Senator, we, in the industry, hate to seem greedy, but in the case of acreage, there are particular reasons why it is very useful in geothermal to have large areas. The point is, it is very difficult to tell exactly where the production area is. One tries to go to where there is a young volcano, or where there is some other geophysical or geochemical indication, but it is difficult to center in on where the production will be.

So, that what we have been having to do is to take down large acreage plots and then eventually narrow them down once we have done the testing on them. So it would be very useful to be able to take more acreage than the 50,000.

Senator HECHT. Senator Murkowski, did you have any statement that you wanted to put into the record?

STATEMENT OF HON. FRANK H. MURKOWSKI, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator MURKOWSKI. I have a statement which I will enter into the record, Mr. Chairman. I want to commend you for holding this hearing. I am very interested in this subject as a member of the subcommittee.

My concern is that we realistically encourage this alternative energy source and realistically recognize that there are some unreasonable suggestions in the buffer zone concept, particularly out in the western area where these buffer zones are really unreasonable. And I would look forward to any reference to that.

I do not believe it has come up in the discussion so far from the gentlemen who are with us.

Thank you, Mr. Chairman.

[The prepared statement of Senator Murkowski follows:]

STATEMENT OF

SENATOR FRANK H. MURKOWSKI

ON

S.1322

MR. CHAIRMAN, I COMMEND YOU FOR HOLDING THIS HEARING. S.1322 IS A BILL WHICH DESERVES THIS CRITICAL ATTENTION. AM A CO-SPONSOR OF THIS BILL AND WOULD LIKE TO SEE IT PASSEDBY CONGRESS THIS YEAR.

I AM CONVINCED THAT GEOTHERMAL STEAM WILL BE A KEY INGREDIENT IN OUR NATIONAL ENERGY PICTURE IN THE FUTURE. THE SMALL CONTRIBUTION IT IS MAKING NOW WILL ONLY BECOME GREATER AS TIME PASSES. IT IS IN OUR BEST INTERESTS TO ACT NOW TO ENSURE THAT THE INCREASE IN USE OF THIS ENERGY SOURCE TAKES PLACE IN AN ORDERLY AND EFFICIENT MANNER. EXTENDING THE DEADLINE FOR DEVELOPMENT OF FEDERAL GEOTHERMAL LEASES IS SUCH A STEP.

I RECOGNIZE THAT THERE ARE DIFFERING OPINIONS ON THE NEED FOR AND THE WISDOM OF S.1322. HOWEVER, IT SEEMS THAT THESE DIFFERENCES ARE CAPABLE OF RESOLUTION. I WILL DO MY PART TO ASSIST IN REACHING A CONSENSUS ON A BILL THAT PREVENTS ABUSES OF THE FEDERAL LEASE SYSTEM; ENSURES THE INTEGRITY OF OUR NATIONAL PARK RESOURCES; AND PERMITS THE ORDERLY DEVELOPMENT OF OUT GEOTHERMAL ENERGY.

THANK YOU MR. CHAIRMAN.

Senator HECHT. As all of you know, during previous consideration of bills to amend geothermal leasing policy, concerns have been expressed regarding developing of geothermal resources in close proximity to certain national parks that could allegedly endanger nationally significant thermal features within such parks. Aside from the three national parks previously recognized as having nationally significant thermal features, Yellowstone, Mount Rainier, and Lassen, that may warrant protection from geothermal development, do you believe that new legislation is needed or are the statutes already on the books adequate to protect such significant thermal features?

Do you know if there is any evidence to support the need to protect 18 other national parks and monuments, as have been identified in previous hearings, from geothermal resource development?

Would any of you care to answer that?

Mr. WILSON. Certainly, that has been a subject that has been of great concern to the industry for a number of years. I think it started back in the 96th Congress, and has been there every Congress since then. We certainly believe that the national parks are protected by current statutes. I can't or am not aware of any area where geothermal has violated any of the purposes that the environmental effort seems to want to restrict.

We don't have a problem if you take specfic parks or monuments, identify them and have a definite buffer zone of a mile or half-mile, or whatever area that is necessary. Then we can all look at that particular area, discuss the merits of a buffer zone and the length of it and set it in place, if that is the situation.

Then we all know what the rules are and we can go forward from that point on. I think that it is not germane to this legislation. This is something that I think should be handled in separate legislation by the appropriate legislation and committee that protects the national parks and monuments. And I don't think it needs to be addressed here.

Senator HECHT. Do you gentlemen believe that trans-Sierra transmission line continues to be a viable option to utilize northern Nevada geothermal resources in the Central Valley of California? Please explain.

Mr. FALCONE. Since we have probably the most interest anyway, currently in Nevada, we are definitely advocates of being able to get electricity out of Nevada to other States, whether it be California or others, for that particular matter.

I think Nevada has a wonderful opportunity in a sense to be a power broker and be able to market geothermal, or electricity generated from geothermal resources in lots of different directions. So, yes, I would think it is still a very viable idea.

Senator HECHT. Thank you, and I appreciate your remarks about Nevada.

If park protection language is required in my bill before it can be passed by this committee and if we cannot agree on just what that language ought to be, the result might be no bill this year. Can you tell the subcommittee what the consequences might be in the absence of legislation this year as that inaction will affect each of you?

Mr. FALCONE. Well, I will take that, as well. As I mentioned before, we probably are the ones who have the most at risk here because some of our leases were entered into back in 1974 and 1975. So, we have leases in California and Nevada that could very well suffer significant detriment after large expenditures on our part have taken place.

We would certainly suffer a significant economic harm.

Mr. NEMZER. Let me add to that, Senator, that even those of our companies which have leases that are relatively new, planning is going on right now for putting down wells, and one of the questions that is necessarily being asked by investors, by bankers and so forth, is what are the long-term prospects, particularly in areas like the Northwest, where return is not going to come for a large number of years.

So that in those areas, as well, it is very important to get a bill soon.

Mr. WILSON. I would certainly agree with that. Our company is not imminently faced within 1 year, but certainly in the very near future, we are going to be in the same situation. I think the entire industry is.

And when you consider that prior to our current energy glut and the slowdown in our industry, in all of energy, if the best of circumstances—the very best that you could hope for just fell into place, one, two, three—from the issuance of the lease to commercial generation and revenue—the best you could hope for would be a 7-year period. That was the very best.

Today, my goodness, I don't know what that number is. It is going to be 10 at least—possibly more. So, I am being redundant by telling you, your legislation is so timely and thank goodness you were foresighted to get this started last year.

Senator HECHT. Thank you. Senator Murkowski, any other questions?

Senator MURKOWSKI. Thank you, Chairman Hecht. I wonder, I know you are all very interested and involved in this area, but would you comment on the dispute on the buffer zones, specifically, as to what is reasonable, what is unreasonable, what it does to your respective leases adjoining national park lands?

Mr. WILSON. Past legislation was so imprecise and vague that the industry had no idea what a buffer zone meant. It didn't have a specific limitation to it.

Senator MURKOWSKI. What was the implied——

Mr. WILSON. If you wanted to take it to the extreme, if you stand on the highest peak in the surrounding area——

Senator MURKOWSKI. That was the integral vista?

Mr. WILSON. Yes; and as far as—if you could see the wisp of steam flume coming up on the horizon, then that was violating the buffer zone.

Senator MURKOWSKI. This included national monuments and so forth.

Mr. WILSON. Yes, sir.

Senator MURKOWSKI. And, of course, the exception was here in Washington, DC, where I guess we have a coal-powered plant on Capitol Hill within two blocks of the national monument, Capitol, or whatever it is.

Mr. WILSON. Yes, sir.

Senator MURKOWSKI. My point is that there is an obvious inconsistency and while it is designed to serve up responsible concern on the environment and ecology, it makes it very difficult for the private sector to work with the resource when your hands are tied with such indefinite and inconsistent policies.

I am wondering, is there any consensus of what you could live with, realistically, if you had your druthers and had something to say about the interpretation of these buffer zones?

Mr. WILSON. If each would be identified, that there is a concern, and then a specific limitation debated and discussed and set, where we would not have the uncertainty facing us, yes, I suppose we could probably live with something like that if we knew up front what it was, had an opportunity to have the appropriate input and discussion that a half-mile would be adequate from around the monument or the park that was in question—or 1 mile. I don't know what that would be.

Senator MURKOWSKI. In your opinion, is the Department of the Interior capable of explaining to you a uniform policy on what they are required to enforce under the law on buffer zones?

Mr. WILSON. I am sure that the Department is capable of explaining it. I don't think it has yet. And I believe that another problem is that between the Park Service and other agencies there is disagreement as to what is proper. The Park Service, speaking at least for my company, is not the agency that is the proper one to administer geothermal lands.

And to expand its purview outside of the national parks doesn't seem to address real problems. Focusing, for example, on one of our—my company's projects, outside of and downhill from Crater Lake. It would do away with one of the most promising geothermal areas in the country, we think, to put a buffer zone there. And there is no reason for it. It has been timbered for decades. The geothermal fluids are not going to run uphill.

Senator MURKOWSKI. How far is the buffer zone, do you know?

Mr. WILSON. Well, there have been a lot of suggestions made. Right now, there is no buffer zone around the park, itself.

Senator MURKOWSKI. But there very well could be if you initiate to develop the project.

Mr. WILSON. Yes.

Mr. NEMZER. I think what you are hearing is not a lack of support for establishing buffer zones around the parks. What you are hearing right now, though, is this particular piece of legislation is so simple and so clear and it does exactly what an industry needs right now. Why muddy up the waters if this piece of legislation with the parks and buffer zone issue when we can take that particular thing on any time it is determined we need to take it on?

Mr. FALCONE. You see, Senator, I just can't see that it is important or necessary because the parks and the monuments are protected by current law and before a lease is issued, an environmental impact statement is completed. And at that time, it is even determined whether or not leasing should take place. Leasing has been denied in appropriate areas in the past, and I am sure will be in the future.

When the environmental impact statement is completed and reviewed, the buffer zone should be discussed and if one is appropriate, then set, under the environmental consequences at that time. So there are so many laws protecting the monuments and the parks at this time. I don't see where an additional section need be added to the many complex laws that we are already operating under.

Senator MURKOWSKI. OK. I just have a couple more observations. The reason I wanted to go into that line of questioning is an obvious one, because I think it addresses the difficulty in planning and expanding and developing the potential because of the concern and the unknown quantities associated with it.

The purpose of my colleague's bill, Senator Hecht, is obviously to extend the leasing process, to encourage the private sector to develop the resource. Is compensation a consideration, in your opinion, of privilege of extending Federal leases to offset administration fees, or revenue?

Obviously you are not producing a return from the leases that are not developed, and the question is what is reasonable compensation is something that may have been addressed—I don't know—in your statements.

Do you feel that it is appropriate for Government to request a remuneration for the extension of leases?

Mr. WILSON. If it is a reasonable nominal, I suppose.

Senator MURKOWSKI. Are you suggesting anything?

Mr. WILSON. No, sir.

Senator MURKOWSKI. Are you suggesting that the leases be extended with no consideration?

Mr. WILSON. No, sir. We think the consideration is the requirement that the lessee continue to either drill wells, or perform other diligent operation, such as geophysical surveys, and all of those are beneficial dollars. They are dollars spent to find the resource, to explore its limit, and be ready to develop the field when that time comes.

If we just take that money and direct it into the Treasury, which, of course, is always nice, but those dollars are no longer earmarked for exploratory activities. We think that that is the critical part. We feel we are paying a consideration, so to speak, by having those requirements placed on us.

Senator MURKOWSKI. You paid for the leases initially. And you are asking for an extension. The question is, Should the leases be considered in a monetary sense for the extended period of time which you are asking for? You have paid for them initially; you didn't develop them because of various reasons and now you are asking for an extension.

I would defer some of them to the chairman, but it would seem to me that that is a question that may be raised at the mark-up; the question of the appropriateness of repayment or additional payment for leases that are extended beyond the period in which they were issued and which consideration was originally received by the Federal Government for the lease.

Mr. NEMZER. Senator, if I may address that for the moment, it seems to me that this is a question that I needed to address at great length in some administrative proceedings with the Bureau

of Land Management, having to do with the acceptability of a lease payment. And by all of our calculations, the royalties which the Government will get if a prospect is developed exceed by so many hundreds of times anything that the Government could possibly persuade the industry to pay for the raw leases; that for the self-interest of the Treasury, as well as for the industry, it is far more cost effective to put the incentive to the development, to the production and to look for compensation from the royalties there than it is to put fees of any more than a modest sort on the early non-productive time.

Senator MURKOWSKI. I agree with you. I think the return to the Government is in the production. Let me just ask the last question I will ask, and ask it from the standpoint of recognition that you people are in the business of making a return from the private sector investment on geothermal, and I commend you for your pioneering diligence under difficult conditions.

My question specifically to each of you, and I assume you would have a different answer, is, What one, single thing could Government do to assist in the development of geothermal? The most important thing, recognizing the tremendous potential and the fact that more often, up to date, Government has been a hindrance in the process as opposed to an assist in the process because of various regulatory oversight applications that you have to live under, but recognizing again, as we seek alternative energy sources, the tremendous potential of this—the process, the recognition that you have an environmentally compatible source of energy. You don't have to worry about the byproduct of pollutants and so forth.

What would you suggest?

Mr. FALCONE. Is your question specifically toward——

Senator MURKOWSKI. Seeing what the Government could do to enhance the development of geothermal in the United States.

Mr. FALCONE. From our point of view, I think a reasonable piece of tax legislation that takes into consideration where the industry is today and where the industry will hopefully be in the next, say, 5 years when I think the market reestablishes itself, would be the one thing——

Senator MURKOWSKI. Specifically, are you talking about incentive as opposed to—you can write off your investment now.

Mr. FALCONE. Right.

Senator MURKOWSKI. For exploration. That doesn't tell me anything.

Mr. FALCONE. Specifically, I think that the intangible drilling cost situation is fine the way it is. I think that an extension or continuation of the depletion allowance is very important to us at this point in time, as is the extension of the energy business tax credit. That is very important for the next x number of years—I don't know what it is, but at least up through the early part of the 1990's, we are going to have to have that particular incentive out there in order to bring in investment, to get the fixed assets on line.

Mr. NEMZER. I would add to that, Senator, that depreciation schedules are very important. And I would suggest that it would be realistic for the Senate to look upon the tax benefits that we speak of not as something that gives us a leg up, so much as something

that gives us a level playing field, because with a technology such as geothermal, which is new and which is longer-term than many other energy sources, money is more expensive for us.

The financial community charges us more for money and therefore, we have to have some incentives, some better depreciation schedules and so forth, in order to be on an even playing field with other sources.

Mr. WILSON. I would concur with my colleagues, and in your deliberations of the current tax bill, most of the things that they have mentioned are in current law. If they would just remain as they are on the books right now, with the exception of the energy tax credit, and if the energy tax credit could be resurrected—it expired as you all know at the end of last year—if it could be resurrected and put back in place as of January 1, and carry forward into the future, that would probably be the greatest incentive that we could have in geothermal.

Mr. FALCONE. Could I suggest one other comment, Senator? I believe I read or heard not too long ago that the chairman of the Finance Committee was suggesting some form of a reimbursement for net operating loss carryforwards.

This particular industry right now, when there is no income available to us, especially the smaller companies who are in the development stage, that kind of a provision would be of significant benefit to the smaller companies because we, for instance, have a $30 to $40 million NOL because our company has no other income source in which to offset the deductions that we have at the present time.

That would certainly help us over the next 4 or 5 years get through some very difficult times which we are contemplating.

Senator MURKOWSKI. I have cosponsored the extension of the energy tax bill. I think it is imperative that we have that incentive.

Mr. WILSON. We appreciate your efforts, sir. I would like to regress just for a moment to one of your earlier questions. I guess it is an obvious point that I would be delighted if my company never had to envoke the extension of the term of a lease because our desire is to get these leases into production and revenue coming back in to the corporation so we can enlarge our activities.

So, there isn't any desire on, I don't think, anyone's part, to have an ability to hold a lease and do nothing. We don't want that and that is why I think the Senator's work requirements are appropriate. It requires someone that may not be that diligent—but you have your investment—you have with it the bonus and the drilling of wells.

Senator MURKOWSKI. The chairman and I have a banking background, and I am just curious: How do you carry one of these leases on your balance sheet when you are down to the year of expiration of the lease?

Mr. FALCONE. Very gingerly. [General laughter.]

Senator HECHT. It is worth nothing; when you are down to the end, it is worth absolutely nothing.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Senator HECHT. Thank you, Senator. I see that I cosponsored extension of renewable energy resources tax credit. I was going to

bring that up. Over 100 years ago, a very wise man said, "The power to tax is to the power to destroy."

And, if we don't tax your industry fairly, we are going to destroy your industry. There is no question about it.

Mr. FALCONE. Absolutely.

Senator HECHT. With that, that will be the end of this panel. We will go right on the next panel.

Mr. FALCONE. Thank you, Senator.

Senator HECHT. Dr. Gordon Bloomquist and Mr. Jarvis.

Gentlemen, your complete testimony will be put into the record, and if you can summarize within 10 minutes any statement, it will be appreciated.

STATEMENT OF DR. R. GORDON BLOOMQUIST, GEOTHERMAL SPECIALIST, WASHINGTON STATE ENERGY OFFICE

Dr. BLOOMQUIST. Thank you, Senator. I am a geologist with the Washinton State Energy Office, and for the past 2 years, I have been coordinating a four-State program for the Bonneville Power Administration, which evaluated and ranked all the resources in Oregon, Washington, Idaho, and Montana.

My comments today will be addressing the situation in those four States, from a government point of view as opposed to the industry point of view, which you just heard.

I am extremely pleased to have the opportunity to address the subcommittee regarding Senate bill 1322. The need to pass legislation such as the subcommittee has before it today was singled out during the course of the Bonneville Power Administration study that we did as the most important institutional issue facing geothermal development at this time.

Actually, at the time that we did the work, the lease extension was also of extreme importance, however, that situation is somewhat better now.

Interest in geothermal development in the four States which I have been working on has been very high and continues to be very high. Lease applications have been filed on several million acres since 1974. At the present time, as of last week, 665,815 acres were under lease. That is Federal leases, bringing revenue into the Federal Government of probably in the neighborhood of $700,000 a year, although no production is taking place.

Many of these leases date back to 1979, or before, and are approaching the end of their primary lease term.

In addition to leasing activity and the interest in leasing in our area, millions of dollars of Federal, State, and private money has been invested in resource assessment and characterization, technology development, and the establishment of a legal and institutional framework conducive to exploration, development, and power production.

This investment by the Federal Government and private industry is going on today. USDOE, together with some of the people you had on your previous panel, are spending a great deal of money investigating the Cascades of Oregon.

During the course of the BPA work, a total of 1,265 geothermal sites were identified in the four-State area. Of those 1,265 sites, 92

were identified as having significant potential for the production of electricity. Of those sites, 29 were identified as being technically capable of supporting a minimum of 1,000 megawatts—and I say a minimum because the total potential is several times that; in fact, as much as 20,000 megawatts—of electrical generation which could be brought online competitive with conventional thermal technologies, such as coal and nuclear.

Despite strong indications of a tremendous geothermal potential in the region, development has been extremely slow due to a number of diverse factors. First, access to many areas has been extremely difficult due to legal, institutional, and environmental conflicts. As an example, in the State of Washington, although over 1 million acres have been applied for since 1974, less than 100,000 acres has actually been leased.

Second, much of the area is extremely complex geologically, thus making exploration very expensive and risky. One of the reasons the Federal Government is involved with the Cascade Drilling Program.

Third, the entire region has experienced a significant power surplus since the early 1980's, a surplus which presently is expected to continue into the mid-1990's, if not longer.

The power surplus has resulted in low avoided costs and has made it extremely difficult, if not impossible, to negotiate a power purchase agreement with the Bonneville Power Administration, or with a utility in the BPA service area.

In addition to the lack of market within our area, the lack of tie line capacity to southern California and markets there have made shipping power out of the region impossible.

It is this lack of market within the BPA service area and the inability to reach external markets that makes legislation to allow for an extension of the primary lease term so vital to future geothermal development in the Northwest.

Without the availability of such a lease extension, energy companies and utilities will find it extremely difficult, if not impossible, to justify the expenditure of large sums of money which are required to confirm the existence of viable geothermal resources capable of providing significant amounts of electrical generation.

Without the lease extension, they cannot expect that they will ever receive a return on their investment.

Mr. Chairman, a question I am frequently asked locally, in Washington and Oregon, and I am sure one that you will be asked, is why is it necessary or desirable to extend the primary lease term during a prolonged period of surplus. In fact, why shouldn't the leases simply be allowed to expire and the land reoffered if and when the energy situation warrants?

As was pointed out to me, the resource is not going to disappear during this period of time. However, the answer lies in the fact that in order to ensure that geothermal energy is a viable option to meet future generation needs, exploration and reservoir confirmation is needed now.

Geothermal exploration and reservoir confirmation can take anywhere from 5 to 8 years, and as one of the panelists said, probably a minimum of 7 is more realistic, to complete. When a need for

power is recognized, and a decision to acquire further generation is required, it will be too late to begin geothermal exploration.

At the present time in the Northwest, we have no known high-temperature geothermal resources that could provide 100 megawatts or more of generation potential.

A decision to acquire future generation will probably be made in the next 3 to 5 years. At that time, our options are coal or nuclear. If we do not have the geothermal exploration proceed at this time, we won't have the option of using geothermal.

We need to encourage exploration and reservoir confirmation during this present period so that when a decision to acquire future generation is made, that we will have a full knowledge of all the available options.

Geothermal can become one of those options, but the chance of that happening will be greatly reduced without the passage of the legislation which you have before you today.

I urge the subcommittee to give careful consideration to the benefits this legislation will have upon ensuring the availability of a full range of options upon which future energy decisions can be made. And I urge you to pass S. 1322.

I would like to comment just briefly on a couple of things the Department of the Interior said. One is, much like the industry representatives you listened to, I worry about forcing people to put all of their lands into units. The unit agreement requires that you go into some types of exploration that may not be the most desirable for industry at that time.

And the other thing is that if drilling is the only criteria for extending the lease, and other expenditures are not allowed, you are dictating to industry how they should spend their exploration dollars. They should be free to choose whether drilling at that present time is the most viable option for them, or if maybe some geophysical surveys or other techniques are more viable.

Thank you.

[The prepared statement of Dr. Bloomquist follows:]

TESTIMONY ON
SENATE BILL S.1322

Presented to

The United States Senate
Committee on Energy and Natural Resources
Subcommittee on Natural Resource Development and Production

By

R. Gordon Bloomquist, Ph.D.
Geothermal Specialist
Washington State Energy Office

April 24, 1986

Mr. Chairman, Members of the Subcommittee:

My name is Dr. R. Gordon Bloomquist. I am a geologist with the Washington State Energy Office, and for the past two years I have served as regional coordinator for the Bonneville Power Administration's (BPA) Geothermal Resource Assessment Program which has evaluated and ranked geothermal resources in Idaho, Montana, Oregon, and Washington.

I am very pleased to have this opportunity to address the Subcommittee regarding Senate Bill 1322, the "Geothermal Steam Act Amendments of 1985." The need to pass legislation such as the Subcommittee has before it today was singled out during the course of the BPA Geothermal Assessment Program as the most important institutional issue facing geothermal development at this time.

Interest in geothermal development in the four states which were evaluated has been and continues to be high. Lease applications have been filed on several million acres since 1974, and 665,815 acres are under lease at the present time. Many of these leases date back to 1979 or before and are nearing the end of their primary lease term. In addition to the lease activity, millions of dollars of federal, state, and private money has been invested in resource assessment and characterization, technology development, and the establishment of a legal and institutional framework conducive to exploration, development, and power production.

During the course of the BPA Geothermal Assessment Program, a total of 1,265 geothermal sites were identified in the states of Idaho, Montana, Oregon, and Washington. Of the 1,265 sites considered, 92 were identified as having significant potential for the production of electricity. Seventeen sites were rated as having superior development or economic potential. Twenty-nine of the sites were rated as technically capable of supporting a minimum total of at least 1,000 MW of electrical generation which could be competitive with the bus bar cost of conventional thermal technologies.

Despite strong indications of a tremendous geothermal potential in the region, development has been extremely slow due to a number of diverse factors. First, access to many areas has been extremely difficult due to legal, institutional, and environmental conflicts. Second, much of the area is extremely complex geologically, thus making exploration very expensive and risky. Third, the entire region has experienced a significant power surplus since the early 1980s--a surplus which is expected to continue, at a minimum, into the mid-1990s.

The power surplus has resulted in low avoided cost and has made it extremely difficult, if not impossible, to negotiate a power purchase agreement with the Bonneville Power Administration or with a utility in the BPA service area. In addition to the lack of market within the region, the lack of available tie line capacity to California has and will continue to prevent the sale of power to areas where an expanding market and higher avoided cost could make geothermal energy development economically attractive.

It is this lack of market within the BPA service area and the inability to reach external markets that makes legislation to allow for an extension of the primary lease term so vital to future geothermal development in the Northwest.

Without the availability of such a lease extension, energy companies and utilities will find it exceedingly difficult, if not impossible, to justify the expenditure of the large sums of money which are required to confirm the existence of viable geothermal resources capable of providing significant amounts of electrical generation.

Mr. Chairman, a question that I am frequently asked and which I am sure you will be asked is why is there a need to provide for the extension of the primary lease term during a prolonged period of surplus. In fact, why shouldn't the leases simply be allowed to expire and the land reoffered if and when the energy situation warrants.

The answer lies in the fact that in order to ensure that geothermal energy is a viable option to meet further generation needs, exploration and reservoir confirmation is needed now. Geothermal exploration and reservoir confirmation can take anywhere from five to eight years to complete. When a need for power is recognized, and a decision to acquire further generation is required, it will be too late to begin geothermal exploration.

We need to do everything possible to encourage exploration and reservoir confirmation during the present period of surplus so that when decisions related to acquiring further generation are made, those decisions can be made based upon a knowledge of all available options.

Geothermal can become one of those options, but the chance of that happening will be greatly reduced without the passage of the legislation which you have before you today. I urge the Subcommittee to give careful consideration to the benefits this legislation will have upon ensuring the availability of a full range of options upon which future energy decisions can be made, and I urge you to pass S 1322.

Thank you, Mr. Chairman. I would be pleased to answer questions.

Senator HECHT. Thank you, very much. Let us go right on.
Mr. Destry Jarvis.

STATEMENT OF DESTRY JARVIS, VICE PRESIDENT, CONSERVATION POLICY, NATIONAL PARKS AND CONSERVATION ASSOCIATION

Mr. JARVIS. Thank you, Mr. Chairman. It is a pleasure to once again be before this committee on this subject, although I must say it is the fourth time in 9 years that I have appeared here on this subject and not much progress has been made.

We have no particular objections to the provisions of your bill, to extend the terms and size of leases. But I do believe that it is important that as that is done, it is reasonable to expect the committee to deal with the issue which is of concern to us, which is the thermal features of a number of national parks which could potentially be altered or damaged by adjacent geothermal drilling.

There are some 21 units in the System, as you have noted earlier in this hearing, Mr. Chairman, that have thermal features. I have attached to my testimony a list of parks that include both those with thermal features, that could be—the thermal features of which could be adversely affected, and some additional ones where there is some potential for geothermal activity that could have other types of effects, although my concerns today and the comments that I will make about specific provisions that might be incorporated into legislation do not relate to that other category, which as other witnesses have observed, could be dealt with through existing law. Although I would point out, we do not believe the existing terms of the Geothermal Steam Act are adequate to deal with parks that have thermal features that could be affected by geothermal activity.

One of the primary needs and one of the frustrations that I have felt over the past 9 years is that the Park Service has not been able to conduct the necessary research to give the kind of precision and information that the industry has sought, as they have admitted and acknowledged their willingness to take these concerns into account. Had the Park Service been able 9 years ago to initiate the kind of research that is necessary to provide baseline information, much of the uncertainty could have been eliminated.

In the case of Yellowstone, which has been the most prominent example, I would point out that it, too—the first national park in the world, the most prominent national park in the world—the processes of geothermal energy and thermal features of the park is very ill-researched and little known. In fact, within the last 2 weeks, two new geysers have emerged for the first time in the Biscuit Basin Area of the park; one with a 50-foot plume. These are the first new geysers to appear in the park since the large earthquake in 1959 that altered a number of features in the park.

Our concern in part is based on comments that have been made by scientists expert in this field. One USGS scientist noted that natural discharge of water and heat has increased 2 to 10 times by most exploitation programs and, in general, we cannot exploit the geothermal energy of an area and also preserve its geysers.

The Island Park Area, adjacent to the western boundary of Yellowstone has been one that this Congress, this committee has addressed in the past, including most recently a provision to withdraw 188,000 acres of that area from geothermal leasing. That may in fact have been excessive and unnecessary, in some respects, but because the data is not there, Senator Melcher and others who initiated that legislation felt that some action was desirable.

I would concur with that. The research is essential if we are to be able to define these areas.

I would also note that the moratorium in Island Park does not cover State and private lands which are extensive in this area, and also, as far as Yellowstone as a whole is concerned, does not cover the KGRA to the northern boundary of the park, the Gallatin National Forest, where within the last month, the Church Universal and Triumphant has drilled a geothermal well on its private lands, adjacent to the northern boundary of the park, surrounding by Gallatin National Forest.

Some research that is still in progress, though reported in the Montana press, has indicated that the water source for much of the thermal features of the geothermal basis of the park comes from deep aquifers under the Gallatin National Forest, to the north. The potential—I couldn't even speculate that one well would have adverse effects, but it is a KGRA. Other leases are pending; applications have been filed and it is essential that we know more before these things proceed.

The research money throughout the system is drying up—no pun intended.

At Lassen Volcanic National Park in California, and one of the reasons why we have concern about the adequacy or the inadequacy of the existing provisions of the Geothermal Steam Act, the Forest Service on the Lassen National Forest that surrounds the park has taken the position that they do not have the authority to impose lease stipulations to protect the adjacent park. They have the authority to impose lease stipulations to protect the forest lands, but not to protect the adjacent park.

We have been in administrative appeal for several years over proposed leasing in the KRGA to the south of the park, and the only conclusion to date in that is that they readily admit that the provision in the act that states that the leasing on national forest lands is "subject to such terms and conditions as may be prescribed by the Secretary to ensure adequate utilization of the lands for the purposes for which they were withdrawn."

That provision does not allow them, they believe, to impose lease stipulations for protecting the park thermal features. There are some 38 lease applications within 15 miles of the park, covering some 61,000 acres. Some of that may be of concern. Research is needed, consideration is needed. We would hope you would take that into account.

In a very different situation in Hawaii Volcanoes National Park, that I would like to call to your attention. Geothermal drilling has been proposed on an area of private land within the authorized boundary of the park. To the credit of the Hawaii Congressional Delegation, the two Senators have just introduced a bill, S. 1320,

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that proposes a three-party land exchange that will work to the mutual advantage of all concerned.

The geothermal company will be able to acquire some State lands, further from the park, which are reputed to be of high energy of thermal potential, and move right ahead with no concerns. The State will acquire some surplus Federal lands and the park will get from the State what is currently private land within the park's authorized boundary.

In that particular circumstance, that appears to be a wonderful solution for all concerned and we would commend that to your attention.

At Crater Lake National Park in Oregon, as has been noted by earlier witnesses, leases have been issued. Temperature grade and test wells may be drilled this summer. There, the thermal features of the park are less obvious, but research has indicated that there is thermal input to the bottom of that very deep lake, and one of the hypotheses under which the researchers operate is that that thermal input is one of the attributes that contributes to the intense clarity and blue color of that lake.

Senator Hatfield, a couple of years ago, had the Congress authorize and fund an intensive lake research program. That lake research program is far from complete, but runs out of money this year. We think that if, and as we assume it will, the activity in that national forest continues, the geothermal activity, that Lake research program is critical and must be funded.

I have listed in my statement some 10 specific recommendations that I would hope you would consider as the committee proceeds to mark up on this legislation. We think that inclusion of those would give the committee some greater ability to address this issue, and yet, not violate the concerns of the industry.

Directing the Secretary to list those thermal features of parks that are nationally significant would provide some finite nature to define the universe here. Having the Secretary define the geographic zone of concern outside of which there would be no restriction imposed as far as park protection is concerned, within which we are not asking for a prohibition; simply asking for consideration.

The Secretary should have the right to deny the leases within the zone if he finds, through their research, that there is a potential, foreseeably significant adverse effect.

The Secretary should have the authority to determine prior to issuance of leases that if evidence exists that the lease should not be issued. A strict monitoring system should be established so that as geothermal activity proceeds, the park can monitor whether there are any effects, or not. And if there are effects noted, the Secretary should be able to halt production while they determine whether there is a correlation.

There should be a requirement that spent fluids be reinjected tc help maintain the hydrostatic pressure in case there is a subterranean connection.

I think these are very reasonable requests, Mr. Chairman, and I commend them to your attention as you proceed to mark up this legislation. We think that the national parks have contributed a considerable amount to the economy of the West, to our national

heritage, and we are reknown throughout the world for taking these things into account in our culture.

Thank you, very much.

[The prepared statement of Mr. Jarvis follows:]

STATEMENT OF DESTRY JARVIS

VICE PRESIDENT FOR CONSERVATION POLICY

NATIONAL PARKS AND CONSERVATION ASSOCIATION

Before the

SUBCOMMITTEE ON NATURAL RESOURCES DEVELOPMENT AND PRODUCTION

U.S. SENATE

on S. 1322

April 24, 1986

Mr. Chairman, and Members of the Subcommittee, my name is Destry Jarvis, Vice President for Conservation Policy of the National Parks and Conservation Association (NPCA), which, for over sixty years has functioned as an independent conservation group dedicated to the protection and preservation of this country's magnificent national parks. We appreciate the opportunity to testify on S.1322, amendments to the Geothermal Steam Act of 1970.

It is imperative that if Congress is to consider extending geothermal leases and encouraging the development of these resources you must also consider the impact this development will have on park values and these geophysical features of irreplaceable value wherever such leases occur in proximity to park boundaries. Those seeking to develop these resources should be dealt with fairly by defining now those areas which are most likely to be safe for development and under what conditions these developments may occur.

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The history of thermal energy development in relation to protection of significant thermal resources, worldwide and in the U.S., has been haphazard, speculative, and most unfortunately, in many instances, resulted in irreversible and irrevocable loss of thermal resources. Of the ten major geyser areas in the world, only three have been left undisturbed, including Yellowstone National Park. The other seven have either been severely, adversely affected or completely destroyed. Twenty-one units of the national park system contain significant geothermal features which contribute to their unique ecosystems and outstanding criteria for inclusion in the system. Our primary concern is in the protection of these rare and magnificent resources and in preserving the integrity of the National Park System. All parks are afforded equal protection under the law, to the exclusion of no one unit. Therefore, we strongly urge that any amendments to the Geothermal Steam Act must include specific park protection language generic to any of the twenty-one national park system units where thermal features occur.

The most important determination to be made before the commencement of any geothermal development near any national park must be accurate and conclusive findings that no subterranean interconnection exist between the thermal features available for leasing and development outside park boundaries and those within the parks. To suggest that there is a measurable buffer area surrounding a park's thermal features which will ensure the protection without the benefit of accurate data identifying underground connections of the calderas in any of the park areas with those outside park boundaries would be ill-advised. Park boundaries and proposed buffer areas are artificial and cannot accurately reflect the nature of the resources in need of protection until the proper scientific evaluations are made.

To this end, it should be pointed out that the advent extent, and subsidence of geothermal phenomenon is still a very ill-researched process. Though hypotheses exist, too little work has been completed to date to predict with any accuracy the likely effects of nearby geothermal drilling. Even in Yellowstone National Park there is only a far from incomplete picture of the geothermal process. Within the past two weeks, for example, two brand new geysers have emerged in the Biscuit Basin area of the park, one with a 50 foot plume. These are the first new geysers to appear in Yellowstone since the major earthquake in 1959, when several of the park's thermal features were altered.

National parks were not set aside for speculation and experimentation, nor were they set aside to become the focus of opposing factions of both scientific and lay communities who have yet to make accurate and nondebatable determinations as to the connections and extensions of underground geothermal systems. There are no degrees of adverse effect, significant or otherwise, which should be intentionally imposed on national parks.

Many scientists maintain that there are definite and serious risks to park thermal resources if adjacent areas are developed. One U.S.G.S. scientist has concluded, "that natural discharge of water and heat is increased two-to-ten times by most exploitation programs (and), in general, we cannot exploit the geothermal energy of an area and also preserve its geysers." A Park Service Environmental Compliance Chief has cautioned, "It is very difficult to detect cause and effect relationships" in geothermal changes.

Laws governing the protection of our national parks do not contemplate such analytical hindsight. The history of geothermal development in two areas in the West has proven how shortsighted we can be. The Beowawe Geysers in

Nevada (at one time second only to those of Yellowstone in North America) stopped flowing by 1961 after centuries of activity because wells were drilled nearby in the 1940s and 1950s and allowed to discharge. Steamboat Springs, Nevada has also suffered due to geothermal activity during the 1950s and 1960s.

The four national park system units which would be most immediately threatened by geothermal exploration and development are Yellowstone National Park, Lassen Volcanic National Park, Hawaii Volcanoes National Park and Crater Lake National Park. The Island Park Geothermal Area, adjacent to Yellowstone's western boundary awaits action on over 100 geothermal lease applications. The Island Park's eastern boundary is adjacent to Yellowstone and is thirteen miles from Old Faithful Geyser. Two completed studies have not ruled out a potential structural link between the Yellowstone-Island Park Calderas; have shown no evidence of structural barriers to fluid migration between the calderas; and have recommended the need for great caution with the development of the Island Park Area. Of the pending lease applications 108 are within 15 miles of the park and cover 175,000 acres.

Although the Congress has imposed a statutory moratorium on issuance of leases in the Island Park KGRA, no similar restriction exists over the large state and private acreage in the same area, nor over the KGRA of similar size on the park's northern boundary, covering the Gallatin National Forest. USGS studies still in progress, but reported in the Montana press have indicated evidence to support the belief that the water source for much of the Yellowstone geyser basins originates in the deep aquifers beneath the Gallatin National Forest. If this proves to be the case, any drilling on these lands

should only proceed after very careful research and with constant monitoring. Quite recently, a geothermal well appears to have been drilled by the Church Universal and Triumphant on private lands near the northern boundary of the park.

At present, the only geothermal research underway at Yellowstone, is the third year of a three year project by the USGS to estimate the total thermal output for features of the park, broken down by basin. This data will help the park to set baseline standards for existing conditions, which can be useful if monitoring stations are established in conjunction with any future drilling.

Unfortunately, however, the research funding for geothermal work in the parks, even at Yellowstone, is drying up (no pun intended). Yellowstone alone needs a minimum of $50,000 per year in new base funding in order to reestablish geothermal research and continue it into the future. There is currently no research work underway relative to potential management problems which could result from adjacent drilling. Even adjacent oil and gas drilling, which is potentially more extensive than geothermal drilling, could have devastating effects on park geothermal features, if such wells hit one of the subterranean passages, thus disturbing the subsurface equilibrium which must exist between the water, heat source and thermal passages connecting with the surface features in the park.

In addition to the thermal features in the Park, Yellowstone's other features would also be subject to adverse affects of geothermal development. In past years, Interior officials have expressed their concern as a result of

proposed geothermal development, for threatened and endangered species including the grizzly bear, bald eagle, peregrine falcon and gray wolf as well as specialized aquatic wildlife who depend on the delicate balance of nutrients provided in the hot springs.

The impacts of geothermal exploration and development of the Island Park calderas on the Yellowstone ecosystem, as listed in the Draft Environmental Impact Statement (DEIS), include permanent and temporary intrusions on the quiet and solitude of the region, air quality degradation and unpleasant odors, reduction of wilderness visual quality, and possible alteration of geothermal resources. There are also the problems of increased fire risk, effects of seismic activity, acid rain and ozone air pollution and thermal pollution.

Direct damage to the Island Park Area must not be excused from consideration either. Our concern extends to the Island Park area because of the range of the threatened grizzly bear from the park into that area. In 1979 EPA stated, "The development could cause significant environmental degradation to a largely pristine area adjacent to a national park...there appears to be potential for contamination of surface water important as sources of drinking water." Island Park habitats would suffer from ORV use in areas where now there are no roads or trails and from explosives used in seismic mapping. Exploration and developmemt of geothermal resources would require the clearing of 1.5-2.0 acres of land for each generating plant and the carving of transportation pipelines and corridors through the forest which in turn could cause negative impacts on watersheds. Additionally, soil erosion and compaction, changes in vegetation because of heat loss, sewage

runoff, introduction of exotic species, lowering of water tables, and mixing of aquifers present serious threats to the existing ecosystems.

The thermal features of Lassen Volcanic National Park in California could be seriously jeopardized as well including; Terminal geyser, Boiling Spring Lake, Devils Kitchen and Bumpass Hell. In 1979 drilling and development activity began on a private inholding within the boundaries of Lassen. There are now pending 38 lease applications within 15 miles of the park and covering 61,000 acres. Although a 1982 appeal has stayed all geothermal leasing in the surrounding Lassen National Forest due in part to the serious deficiencies in the Environmental Assessment (EA), including the problem of not addressing the Lassen National Park, strict legislation must protect this park's thermal resources.

At Hawaii Volcanoes National Park, a proposed geothermal drilling project on an area of private land at the edge of the park, but within its authorized boundary could have seriously affected unique flora and fauna not only of the site itself, a virgin forest, but of other nearly park resources. Fortunately, the private land owner, the State of Hawaii, and the Interior Department have entered into agreements, and the Hawaii Congressional delegation has recently introduced a bill, S.3220, which will resolve this problem in a manner satisfactory to virtually all concerns through the device of a land exchange. This exchange, which we strongly support, will result in the addition of the tract in question to the park, will give the private land owner and their energy company partners an even more promising site for geothermal development further away from park resources, and still give the State the opportunity to select certain surplus federal land in the State.

Unfortunately, not all of the problems facing the parks from geothermal development are so easily solved. At Crater Lake National Park, concern has been raised, since park research has indicated that one of the reasons why the lake is so clear and blue is that there is thermal input in the bottom of the lake, over recently issued geothermal leases on the national forest lands surrounding the park. Work has begun around the park, and the NPS is trying hard to gather baseline data. However, despite a specific Congressional mandate to conduct continuing research on the lake water quality, the NPS has no money for the lake research program after this fiscal year. Projects of this type need to be base funded, and continued indefinitely, rather than dependent on special project money, which has a history of being the first lost in times of budget-belt-tightening.

At Crater Lake National Park it is expected that 5 temperature gradient wells will be drilled this summer some within 1/4 mile of the Park and one drill site is within 100 yards of the Park boundary. These are narrow non-production wells, however the permit for this activity covers 100,000 acres.

In 1983 when Congress last addressed this issue, legislation was developed to try to balance the need to protect the parks and to have orderly geothermal development occur. These same issues remain important today.

We believe that any legislation to amend the Geothermal Steam Act of 1970 must take into consideration the affects that this development will have on units of the National Park System. This can be accomplished by:

1. prior to the issuance of any lease or the extension of any lease, requiring the Secretary of the Interior to publish a list of nationally significant features within units of the national parks system. The development of this list should be subject to notice and public comments and provide the public the right to petition for additional nominations to the list. The criteria to be used to determine "national significance" should include:

a. size, uniqueness and other characteristics of such features

b. the scientific or geologic significance of such feature

c. the extent to which such feature remains in an undisturbed natural condition

d. the relationship between such features and other features, resources, and values of a park system unit, including scenic, scientific, wildlife and wilderness values;

2. defining a geographic zone outside national park boundaries where such development may affect the nationally significant features;

3. defining the conditions under which the Secretary may issue leases within these geographic zones;

4. providing the Secretary the right to deny leases for exploration and development on non-federal lands within parks or geographic zones if a "foreseeable significant adverse effect" on a nationally significant geothermal feature is indicated;

5. prior to the issuance of any lease, requiring a finding to determine if indisputable evidence exists to indicate that thermal development activity will in no way affect those features within adjacent national parks;

6. requiring a strict monitoring system for detecting possible adverse effects to a park unit's thermal features;

7. providing the Secretary immediate authority to halt geothermal development activities if present evidence indicates a potential negative impact on park resources;

8. requiring Federal Register notice and the opportunity for public comment each time the Secretary proposes to issue a lease within one of the designated geographic zones and each time he proposes to modify one of the zones based on new data;

9. requiring that spent fluids be reinjected into each geothermal well to help assure maintenance of the necessary hydrostatic pressure in the subterranean geothermal system in order to lessen the chance of damage to such features;

10. requiring continuous monitoring and periodic reporting to Congress of geothermal leasing and development activity in any of the designated geographic zones;

Preservation of the geothermal features of Yellowstone, Hawaii Volcanoes, Lassen Volcanic, Crater Lake National Parks and other national park system units shown on the attached list merits more than an educated guess for a few megawatts of electricity.

We appreciate the opportunity to testify before the Subcommittee and would be happy to answer any questions and provide additional information for the record.

The following are lists of National Park Service units with geothermal and associated volcanic activity. The units in the first list are those with either present exploration and production activity, proposed activity or high potential for such activity within a proximity so as to impact the park resources. The second list consists of park units that may be inferred to have potential for geothermal development based upon recent volcanic and thermal activity in the area and/or thermal features (e.g. hot springs, fumaroles, geysers, etc.) within the park boundaries. The presence of volcanic or thermal activity within or adjacent to a park unit does not necessarily indicate that exploration or development will take place; but it does indicate favorable target area for commercial exploration and development.

Parks impacted, or with high potential for impact, by geothermal activity;

1. Crater Lake NP - 2 Federal Unit Agreements (includes leases and applications adjacent to park boundary) and state leases within 15 mile radius around unit, temperature gradient well drilling permitted and planned for this summer.

2. Lava Beds NM - Federal Unit Agreement (includes leases and applications) within 15 mile radius around unit, Known Geothermal Resource Area (KGRA) adjacent and within unit, extensive drilling in area: 2 deep exploration wells drilled in 1984, many temperature gradient wells drilled in area.

3. Bandelier NM - Extensive past geothermal activity in area: Federal leases and applications, many deep exploration wells and temperature gradient wells drilled in the late 1970's and early 1980's.

4. Yellowstone NP - Federal Lease Applications within 15 mile radius around unit, KGRA in area, significant geothermal features within unit.

5. Lassen Volcanic NP - Federal Lease Applications within 15 mile radius around unit, KGRA in area, significant geothermal features within unit.

6. Hawaii Volcanoes NP - High interest in geothermal development on state and private lands, delicate land exchange is in process.

7. Yosemite NP - Federal Leases and Application within 15 mile radius around unit.

8. Death Valley NM - Federal Leases within 15 mile radius around unit.

9. North Cascades NP - Federal Leases and Applications within 15 mile radius around unit.

10. Mount Rainier NP - Federal Lease Application within 15 mile radius around unit.

11. Sequoia NP - Federal Lease Applications within 15 mile radius around unit.

Parks inferred to be potentially impacted by geothermal development activity:

1. John D. Rockefeller Jr. Mem. Pkwy.
2. Lake Clark NP&Pr.
3. Wrangell-St. Elias NP&Pr.
4. Casa Grand NM
5. Devils Postpile NM
6. Haleakala NP
7. Joshua Tree NM
8. Santa Monica Mtns. NRA
9. Walnut Canyon NM
10. Yosemite NP
11. Wupatki NM
12. Capulin Mountain NM
13. Sunset Crater NM
14. Craters of the Moon NM
15. Hot Springs NP
16. Aniakchak NM&P
17. Katmai NP&P
17. Lake Mead NRA
18. Great Sand Dunes NM
19. Big Bend NP
20. Olympic NP
21. Bering Land Bridge NP
22. Denali NP&P
23. Gates of the Arctic NPP
24. Glacier Bay NP&P
25. Cape Krusenstern NM
26. Whiskeytown NRA
27. Point Reyes NS
28. Muir Woods NM
29. John Muir NHS
30. Eugene O'Neill NHS
31. Fort Point NHS
32. Golden Gate NRA
33. Kings Canyon NP
34. Pinnacles NM
35. Cabrillo NM

Senator HECHT. Thank you, very much. You mentioned these 10 points, which I, in looking over, what I was attempting to do was just get a simple bill extending the leases. Now, for us to come up—perhaps let me backtrack a moment. These points could be addressed in a different bill.

How do you feel about that?

Mr. JARVIS. Well, I think given—you know better than I, sir, but given the workload of the Congress and the committee, to expect the Geothermal Steam Act to be amended twice in one Congress or even in consecutive Congress, is not too likely, I don't think.

Much of what I have suggested here could be done, I think, without too much objection. I think it provides the kind of precision that the industry is looking for; the kind of safeguards that, if the problem develops, which is more of our concern, it can be taken care of. The Secretary clearly will have the authority; there will be no more of these questions about not being able to protect the parks.

I think many of these things were addressed when the bill was reported by this committee in 1980, and there seemed to be quite a bit of support for it then.

So, I don't think, and we are certainly not looking to delay this bill. I don't think it would necessarily do so. I would hope you consider it.

Senator HECHT. Having sat on this committee for over 3 years and watching the nitpicking that goes on over every little word, I question whether we could get the Ten Commandments passed. [General laughter.]

That is why I bring this up to you. Would you object to just a simple bill, as I have introduced, to get this show on the road and continue this geothermal exploration?

Mr. JARVIS. I certainly feel that the provisions of your bill are not ones to object to. But I think what we are asking for is also quite simple. And we are talking about a finite universe of areas. We are talking about a finite number of resources, and I don't think it should offer the kind of complication that would delay the committee to any appreciable extent.

Senator HECHT. I beg of you to sit in here hour after hour, and you might alter your judgments.

Do you seriously believe that "accurate and conclusive findings that no subterranean interconnection exists between the thermal features available for leasing and development outside park boundaries and those within the parks" can be accomplished? Would not this type of determination involve drilling? Do you favor such activity? Would it be fair to say that your underlying objective is to have no geothermal leasing or development by playing on the highly questionable issue of destroying thermal features in our national parks from such development?

That is a loaded question if I ever saw one.

Mr. JARVIS. I think the latter point goes too far, Mr. Chairman. I assure you, we are not trying to alter or halt the industry's necessary activities in the geothermal energy field.

As to the first part of the question, I think what we are asking for is not an absolute finding or determination. We are asking that research be initiated. We asked that 9 years ago. I think we are

asking that as these concerns are addressed, particularly in Yellowstone, for example—the research there has found that, the research to date has found that there is no evidence of structural barriers to fluid migration between Caldaris, for example, and Island Park and within the basins of the park.

Had they found a structural barrier, then, clearly, there would be no problem.

Senator HECHT. Let me just bring up one thing to interrupt you. I have been advised in section 5, page 9, you have the term "indisputable evidence" and my staff seems to feel that is very difficult to obtain. Impossible. Not difficult. I was corrected.

Mr. JARVIS. I think, Mr. Chairman, that that could be read in several ways. I do not intend with that statement, just as we have said in the previous one, in using the term "foreseeably significant adverse affect." We don't intend that there be a finding that there absolutely will not be a problem.

We are asking that prior to leasing, data be developed—hopefully the Park Service should have had this ongoing. They have some work going on in places like Yellowstone, and Crater Lake now.

We want that continued, and if evidence exists that there is a problem, then there shouldn't be any leases. If the drilling is still out—if the research is incomplete, then I think we have to be cautious and that is why we need the monitoring system; that is why you need the ability of the Secretary to have the authority to stop if the problem develops.

So, if I worded that improperly, Mr. Chairman, I would defer to your wishes on that point. We do not intend to imply here that there has to be an absolute determination before a lease can be issued. That, I think, goes too far. But we are asking for some reasonableness in making a finding that if—that the research be followed; that if the research indicates a connection, that we only proceed with extreme caution; that monitoring enable the Secretary and authorities to the Secretary, enable him to control during process of drilling and production if adverse effects occur; that shut down be within the Secretary's powers.

I didn't intend to imply with that provision—or that recommendation——

Senator HECHT. We will have some other questions for you on this. Let me just ask you this. On page 2 of your statement, you indicate that of the 10 major geyser areas of the world, only 3 have been left undisturbed, including Yellowstone National Park. What are the other major geyser areas that you refer to?

Mr. JARVIS. The other two? One is in Iceland and one is in New Guinea, I believe. I could provide that list for the record.

Senator HECHT. Of the 10 major, only 3—what are the other 7?

Mr. JARVIS. I don't have the list with me, but I could provide that for the record. That is from a USGS research paper that I could provide for the record.

Senator HECHT. Please do. On that same page, you indicate that 7 of those 10 geyser areas have "either been severely, adversely affected or completely destroyed." What are the seven you refer to? How were they severely adversely affected or completely destroyed?

Mr. JARVIS. Well this, again, is based on some USGS research that I would provide, in the same paper; it is all in the one paper. I would say that in this case, the reference to damage or destruction is that the geyser's thermal features cease to exist as a result of, in some cases, numerous years of production. We are not saying that that is necessarily bad in those cases because a decision was presumably made in those countries—those are not in the United States—that that was a priority for that country.

What we are saying is when drilling does occur, the features that exist are probably going to be adversely affected. And if, in the case of the national parks, there is a subterranean connection, then it is likely to expect that there will be some damage.

We are not saying that a loss of other seven areas around the world is comparable to the situation in Yellowstone, or Lassen, or Hawaii Volcanoes. Those we have set aside and that is to our Nation's credit. But that because, when development production occurs, features are affected—surficial features, geysers, hot springs, et cetera—we need to be aware that those connections exist and taken into account where drilling is occurring or proposed to occur adjacent to a national park.

But I will provide that list for the record.[1] It is in a USGS paper,

Senator HECHT. Please do. You say they might be affected in these seven different areas which you are going to give us?

Mr. JARVIS. Yes, sir.

Senator HECHT. Dr. Bloomquist, as a geologist, do you believe that without extensive and expensive drilling that we could ever know conclusively and indisputably whether subterranean interconnections exist between the thermal features that might be available for leasing and development outside park boundaries and those within the parks as Mr. Jarvis suggests?

Dr. BLOOMQUIST. No; I don't think so. It is the same as you don't know if you have a geothermal resource outside the park now; you can't tell whether there is a connection between resources that may be outside the park, but the known resource is in the park.

In fact, in testimony I gave this committee about 1980 or 1981 at a congressional hearing on Yellowstone, held in Casper, WY, actually recommended a procedure for determining that. But it would be, as has been recommended by the other gentleman on the panel here, a monitoring of what goes on after industry gets in and starts doing the work. It would not be done beforehand.

It would be a buffer with special provisions in it under which the leases could be developed.

Senator HECHT. Thank you. Of the 1,265 geothermal sites identified in the States of Idaho, Montana, Oregon, and Washington during the course of the BPA Geothermal Assessment Program that you were involved in, how many of these might be precluded from leasing or development if the Congress were to adopt the criteria suggested by Mr. Jarvis on pages 9 and 10 of his statement?

Dr. BLOOMQUIST. I would say that one of the major ones could be Crater Lake. Mount Rainier has received very little interest, but would be one of the areas that would be affected by it, as would

[1] Mr. Jarvis did not supply the requested information.

possibly areas around the Olympic National Park, even though no resource has been discovered outside the park.

So there is a limited number of sites, but some of the higher potential ones, such as Crater Lake, which actually has the potential—number of megawatts that we found in the region—would be severely affected.

Senator HECHT. Dr. Bloomquist, could you tell the subcommittee what the problems are with developing a tie line to California?

Dr. BLOOMQUIST. The tie line capacity is basically totally allocated on the various utilities on the BPA and at this time there is no additional capacity available. So there is no market, or no way to get to market.

Senator HECHT. One moment.

[Pause.]

Senator HECHT. Well, we are right on schedule.

I want to thank all of you. There may be some questions submitted to all of you from myself and other members of the committee, and I thank you for appearing here today.

[Whereupon, at 11:50 a.m., the hearing was adjourned.]

APPENDIXES

APPENDIX I

Responses to Additional Committee Questions

IN REPLY REFER TO

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240

1750(140)

Honorable John W. Warner
Chairman, Subcommittee on Natural Resources
Development and Production
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Senator Warner:

This is in response to your letter of May 7, 1986, in which you transmitted additional questions from Senators Johnston and Bumpers following the recent hearing before your Subcommittee on S. 1322, a bill "To amend the Geothermal Steam Act of 1970."

We are pleased to enclose our responses to those questions.

Thank you for the opportunity to provide these responses to the Subcommittee.

Sincerely,

Director

Enclosures

Questions Submitted by Senator Johnston

(1) How many acres are currently designated as "known geothermal resource areas"?

We estimate that approximately 1.6 million acres of Federal land are classified as "known geothermal resource areas."

Questions Submitted by Senator Johnston

(2) On how many federal geothermal leases is production currently occurring in "commercial quantities"?

There are 26 Federal geothermal leases producing in commercial quantities.

Questions Submitted by Senator Johnston

(3) How many cooperative or unit plans of development or operation have been approved pursuant to the Geothermal Steam Act of 1970?

What total acreage is covered by these plans?

Thirty-one unit agreements or unit plans of development and operation have been approved pursuant to the Geothermal Steam Act of 1970. The 31 unit agreements cover an area of approximately 990,000 acres.

Questions Submitted by Senator Johnston

(4) How many national parks and monuments contain nationally significant thermal features that foreseeably could be adversely affected by geothermal exploration and/or development activities on lands outside the parks or monuments or private lands within the parks or monuments?

Please provide a list of these national parks and national monuments.

For each national park or monument listed, please provide information on outstanding geothermal leases within 50 miles of the boundary of the park or monument including lease location, lessee, date of issuance, expiration date, and status of development.

As you know, the Secretary is firmly committed to protecting this Nation's park resources. Be assured that we have and will continue to exercise caution when considering exploration or development activities on lands that could affect a national park or monument. We are not at this time aware of any national parks or monuments that could foreseeably be adversely affected by geothermal exploration and/or development. In large part this results from the fact that the potential for economic development of geothermal resources outside most parks and monuments is very low. We do not expect this situation to change in the foreseeable future. However, in the event that interest is shown in leasing, we believe that adequate procedures and safeguards exist to ensure that parks and monuments will not be adversely affected. To briefly summarize the procedures involved, at such time as leasing is considered, an environmental review is undertaken by BLM in concert with the surface managing agency, if it is not BLM, and other agencies expressing concern. The review results in an environmental document which is made available for public and other agency comment. The environmental document is largely based on a previously prepared land use plan which was also subject to public and other agency comment. After the comments have been reviewed and the environmental document completed, a number of options are available to BLM. Leasing can be denied, deferred, or stipulations can be included in the lease.

Geothermal leases are generally issued with stipulations deemed necessary to protect resources, values, and land uses/users. BLM routinely requires such stipulations be signed by lessees as a condition of lease issuance to protect riparian areas, scenic corridors, recreational use areas, etc. In addition, the terms of the standard lease form already reserve considerable authority to BLM for controlling the location, design, and timing of any operations, as well as reserving the right to specify the rate of development and to take other actions in the public interest. Given the procedures and safeguards that exist, no park or monument (or any other type of unit within the National Park System), would be adversely affected by geothermal development on Federal lands. We are also not aware of any threats posed by foreseeable development on private lands.

Questions Submitted by Senator Johnston

(5) The Department has, in the past, stated that it has no objection to legislation which would extend additional protection to Lassen Volcanic Park. What is the Department's current position on such legislation?

As in the past, the Bureau of Land Management will continue to work with the National Park Service on individual parks on a case-by-case basis to protect park values.

Questions Submitted by Senator Johnston

(6) In your testimony, you state that the second sentence of Section 6(a) as proposed to be amended by S. 1322 could be interpreted as protecting leaseholds that are not within a "participating area (productive lands)" of a plan. Please describe "participating areas." How are they designated?

A "participating area" within a Federal geothermal unit agreement is that part of the unit area which is considered reasonably proven to be productive in commercial quantities and to which production is allocated in the manner prescribed in the unit agreement. That is, as wells are proven to be capable of production in commercial quantities within a unit, participating areas are established for committed tracts in order for production to be allocated to the appropriate holders of interests in the involved lands. Normally, on geothermal unit agreements, several wells are proven as capable of production in commercial quantities before a participating area is established. In order to designate a participating area, the operator submits a proposal to the appropriate BLM office with the area of coverage and the necessary geologic and engineering data. Based on review of the proposal, the proposed participating area is either approved or approved as modified.

Questions Submitted by Senator Johnston

(7) As set forth in your testimony, the Department's proposed language for Sections 6(c)(2) and 6(c)(3) is very similar, yet Section 6(c)(3) would require drilling to a depth specified by the Secretary, while 6(c)(2) would not. Why?

The intent of the Department's proposed language for section 6(c)(2) is to preserve the present opportunity for lease extension enjoyed by lessees, that is, drilling to a depth of their choosing over the expiration date of leases. Proposed section 6(c)(3) would create a new opportunity for lease extension, an opportunity which we believe to be quite generous in that a lessee could drill a well in the first or second year of the lease term and be qualified for a 5-year extension at the end of the tenth year even if no further drilling had occurred. Because of the substantial benefit to be obtained by a lessee under proposed section 6(c)(3), we believe that the public deserves a substantial benefit. Therefore, the section would allow the Secretary to specify the depth of the well. This would ensure that the well would be deep enough to have high probability of encountering geothermal resources. We would prefer to see the same requirement in section 6(c)(2), but this would disturb the present opportunity for lease extension that exists not only in geothermal leasing but in oil and gas leasing as well.

Questions Submitted by Senator Johnston

(8) Would the Department require anything other than actual drilling as a prerequisite to lease extension under Section 6(c)?

We would prefer not to have any alternative. We believe that 10 years is long enough for a lessee to have completed exploration studies and analyses, and drilled a deep exploratory well, particularly since S. 1322 would remove the disincentive that a lease actually be in production by the end of the fifteenth year.

Questions Submitted by Senator Johnston

(9) Would the Department allow extensions for leases that are not in "participating areas" of a plan under the Department's proposed changes for Section 6(c)?

Yes. Individual leases would be entitled to extension in the same manner as leases within units. Note that leases within "participating areas" do not need extensions since they are held by production.

Questions Submitted by Senator Johnston

(10) How often does BLM currently conduct reviews of cooperative and unit plans?

In most cases geothermal unit agreements are reviewed within a year of the conclusion of any drilling operations to determine if any lands are not reasonably necessary for unit operations and should be subject to elimination from the agreement. For most unit agreements drilling operations are required every 18 months. Thus, most agreements would receive such a review at least every 30 months.

Questions Submitted by Senator Johnston

(11) Please describe the steps undertaken by the Department to comply with the National Environmental Policy Act prior to issuing a geothermal lease.

A land use plan is prepared and determinations are made as to the best mix of land uses/users. Until recently, these plans served as a guide when leasing decisions had to be made. The proposals to lease were then analyzed in an environmental assessment (in a few instances, an environmental impact statement (EIS) was prepared) and alternatives and impacts were considered. Under the Bureau of Land Management's new procedures, areas where there is interest in geothermal resources will be addressed in the EIS that will accompany the land use plan. In areas where interest has not been shown, environmental assessments (or possibly EIS's) will continue to be done prior to leasing.

Questions Submitted by Senator Bumpers

(1) How many federal geothermal leases are currently outstanding?

How many acres do these leases cover?

At the end of fiscal year 1985 there were 1,248 geothermal leases covering 2,123,610 acres.

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Questions Submitted by Senator Bumpers

(2) How many outstanding leases were issued competitively?

What is the total acreage of these leases?

There are 267 competitive leases totaling 438,509 acres.

Questions Submitted by Senator Bumpers

(3) How many outstanding leases were issued noncompetitively?

What is the total acreage of these leases?

There are 981 noncompetitive leases totaling 1,685,101 acres.

Questions Submitted by Senator Bumpers

(4) How many national parks and national monuments, in the Department's view, contain nationally significant thermal features?

Would you list those parks and national monuments?

The following eleven parks have nationally significant geothermal features:

1. Yellowstone NP
2. Hawaii Volcanoes NP
3. Lassen Volcanic NP
4. Hot Springs NP
5. Crater Lake NP
6. Olympic NP
7. Big Bend NP
8. Bering Land Bridge NP
9. Lake Clark NP&P
10. Wrangell-St. Elian NP&P
11. Gates of the Arctic NP&P

Questions Submitted by Senator Bumpers

(5) How many geothermal leases are currently outstanding on lands adjacent to national parks or national monuments?

Please provide information on the lease location, lessee, date of issuance, expiration date, and status of development for each such lease.

There are 46 geothermal leases covering 76,515 acres within the Winema National Forest adjoining the eastern and southeastern border of Crater Lake National Park. These leases were issued to the California Energy Company on December 20, 1983, and will expire on April 30, 1995. The leases contain a contingent rights stipulation which would allow denial of operations should there be unacceptable environmental problems.

The leases are included in two exploration units. The company must meet its exploration unit obligations (commitment of $6.40 per acre or $489,696 for exploration) by the end of October 1986 or the units will be in default.

A detailed environmental assessment (EA-OR-010-84-28) on California Energy's exploration plan was completed in December 1984. Drilling activity, if and when it occurs, will be subject to strict stipulations and noise monitoring, developed in consultation with National Park Service personnel. No exploration drilling has occurred on these leases to date, but the company has recently indicated that it expects to commence exploration drilling this summer.

Questions Submitted by Senator Bumpers

(6) Does the Department support legislation to ensure the protection of thermal features within the national parks and monuments?

If not, what steps does the Department plan to take to ensure the protection of thermal features within the national parks and national monuments?

The Bureau of Land Management will continue to work with the National Park Service on individual parks on a case-by-case basis to protect park values.

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UNOCAL 76

Joseph L. Wilson
Vice President
& General Representative

May 19, 1986

The Honorable John W. Warner
United States Senate
Committee on Energy and Natural
Resources
Washington, D.C. 20510

Dear Senator Warner:

I must apologize for not responding to your letter of May 7, 1986 earlier, but I have been out of the city for the past week. The following are answers to the questions set out in your letter.

1. Currently Unocal holds six federal leases which are producing in commercial quantities. Five of these leases are in The Geysers area and one in the Heber area of California. We have drilled two more wells in two other areas which we believe are areas that may be capable of producing geothermal energy in commercial quantities.

2. Union holds 68 nonproducing geothermal leases in seven states. In addition to these leases, Union holds 74 lease applications.

   As to the outlook for bringing these leases into production, a number of occurrences must take place. Besides drilling and testing to determine if there is a productive resource in these prospect areas, a market for the sale of the resource must also be available.

   The utilities over the near-term seem to have a sufficient supply of energy. However, in the early 1990's utilities are forecasting a need to increase their energy supply. Therefore, the outlook for

bringing these leases into production is optimistic within 15 years, if adequate exploration efforts are pursued by the industry.

3. Yes.

4. One point which must be noted is that each lease in a prospect area does not require actual drilling or exploration efforts to evaluate the block of leases.

   With the above in mind, the answer to your question is no.

5. Union has currently drilled 47 commercial size wells with additional wells in progress or planned.

6. Yes. Union has 33 leases in six different units in three states.

7. This provision is acceptable if the decision to eliminate lands from a unit is a joint decision by the Secretary and the unit operator.

Thank you for the opportunity to make additional comments on S.1322.

Yours very truly,

Joseph L. Wilson

JLW/blk

Geothermal Resources International, Inc.

May 16, 1986

The Honorable John W. Warner
United States Senate
Washington, DC 20510

Re: S.1322
Geothermal Steam Act Amendments of 1985

Dear Senator Warner:

Thank you for your letter of May 7, 1986 to Domenic Falcone, Executive Vice President of our company. Since my department is responsible for maintaining and administering all our company's geothermal leases, he asked me to respond to the questions submitted by Senator Johnston. The answers are listed in the order submitted.

1. We currently have no Federal leases producing geothermal resources. However, we do have a lease in Dixie Valley, Nevada on which two wells have been drilled which are capable of producing geothermal resources in commercial quantities. Currently, plans are being made to construct a power plant and transmission line for transmission of electricity to Southern California. Concerning these latter items, a number of years have been spent in fulfilling other development requirements pertaining to this project, i.e.: environmental reports, obtaining approvals for rights-of-way, selection of contractors, etc.

   We anticipate that, following exploration on other leases in Nevada and Oregon, sufficient resources will be found to do similar development projects there.

2. We currently hold 54 Federal geothermal leases which are in the exploration category (non-producing). Depending on the combination of (1) location of these leases, and (2) the availability (presence) of a market, many of these leases will be explored for their potential geothermal resource capability. Even if the resource is not hot enough to produce steam for electricity generation, there are many local applications for geothermal energy in the "hot water" resource category that could result in the development

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of these Federal leases. The continual expansion of uses for this latter form of energy will continue for decades. Further technological development of these low temperature applications can significantly reduce our dependence on other forms of energy. We feel that many of our leases may also fall into this latter category, but it will take some years to develop them economically.

3. The adequacy of a five year term lease extension is somewhat difficult to determine. Although it would be impractical to evaluate the specific circumstances surrounding each extension request, relevant factors (i.e., geographical location, temperature and quality of resource encountered, market availability) are of significance in determining the time required for development and production. As time progresses, undoubtedly new applications for this resource will be found, and companies who have made expenditures on these leases should be given as much time as possible to reap the benefits of their investment and efforts.

4. On current valid leases we have spent a total of approximately $3,100,000 on exploration operations. Substantial sums were spent on exploration-related activities on leases which have also expired during the past 5 or 6 years. In addition to annual self directed budgeted items, we are currently committed, by the terms of unit agreements, to spend an additional $3,500,000 on exploration activities in unit plan areas over the next 2-1/2 years.

5. Two (2) production wells, capable of producing geothermal resources in commercial quantities, have been completed on our Federal leases. Additionally, numerous temperature gradient holes, up to 4000' in depth, have also been drilled on other leases to determine their resource potential.

6. We hold 24 Federal leases that are located within unit plan areas. Additionally, we have certain rights to acquire an additional 70 leases that are currently in unit plan areas.

7. Any review to determine what leases are to remain in a unit because of their "reasonably necessary" status should take into account the past activities of the operator within the unit area and the results derived from these activities; and also, and possibly more importantly, the economic state of the business or industry at the time the review is made.

Very truly yours,

Peter A. Hansen
Vice President-Land

MM

GEOTHERMAL
RESOURCES
ASSOCIATION
P.O. Box 598 • Davis, California 95617-1350 • (916) 758-2360 Telex 882410
Chairman's Address: c/o California Energy Company, Inc. 3333 Mendocino Ave.
Santa Rosa, Ca. 95401 (707) 526-1000

May 28, 1986

Subcommittee on Natural Resources
Development and Production
Committee on Energy and Natural Resources
U.S. Senate
Washington, D. C. 20510

RE: S1322
Questions subsequent to Hearing of April 24, 1986

Gentlemen:

This will respond to your inquiry of May 7, 1986. At the hearing I represented the Geothermal Resources Association. While I do not have statistics for other members of the Association, I can respond to all questions with reference to California Energy Company, Inc., for which I am employed as General Counsel.

1. Leases with Production. No California Energy lease currently has production. As operator and joint venture partner for Coso Land Company, California Energy is currently drilling its first production size test well on one of its federal geothermal leases (located within the China Lake Naval Weapons Center in Inyo County, California.)

2. Cal Energy and associates working interest owners hold the following issued leases and lease applications, none of which are producing in commercial quantities:

	Federal Leases (Acres)	Federal Applications (Acres)
China Lake Naval Weapons Center	18,731.04	- 0 -
Elsewhere in California	59,547.57	9,696.55
Oregon	106,239.75	49,404.37
Washington	- 0 -	9,900.30
Total Acres	184,518.36	69,001.22

NOTE: Acreage limitations are being met largely through establishment of federal exploration units.

The outlook is excellent for bringing into production the leases at China Lake Naval Weapons Center. Drilling has commenced and early indications are

favorable, permitting is well under way, a plant is contracted for and a power sale contract is in place. Power should be on line in less than three years.

The outlook is much different in Northern California, Oregon and Washington. Exploratory work makes the company optimistic that several areas will eventually produce geothermal fluids in commercial quantities. However, the absence of a current market for power suggests that 15 years may be a short time to have many of the leases brought into production.

3. Adequacy of extensions up to 15 years. Lease extensions of five years, up to a total of fifteen years, should be sufficiently long for most leases. If the energy market and other factors dictate otherwise in future years, necessary amendments to the statute could be considered. It is important now to get this S 1322 passed.

4. Investment in leases. Investments in the nonproducing leases have been extensive. At China Lake, between 3 and 4 million dollars has been spent in exploratory work through the drilling of gradient holes and commencing the first production size hole. A like amount has been spent in the several areas of the northwest, for geophysical, geochemical and geological work preparatory to drilling gradient holes.

5. Completed Wells. There are no completed wells on any of the Cal Energy leases. Prior to the well currently be drilled there have been six deep temperature gradient holes drilled.

6. Unit Plans. Cal Energy is operator of two federal exploration units in the Winema National Forest in Klamath County, Oregon, covering 76,000 acres of federal leased land. It is also operator of two exploration units in the Shasta-Trinity National Forest of Siskiyou County, California, covering 49,555 acres of federal leased land.

7. Five Year Reviews. In general, questions as to the size of units are most prudently made by the operators on the basis of market forces. An obligation upon Interior to substitute for this private function might be a burden on Interior, and the consequences of an error by Interior could well outweigh the gain. But the objection is not an urgent one, so that if an amendment process jeopardizes the bill for this year then amendment should be foregone.

Thank you for your concern.

Very truly yours,

GEOTHERMAL RESOURCES ASSOCIATION

Kenneth Press Nemzer,
Chairman

KPN:td

RICHARD H. WATSON
Director

STATE OF WASHINGTON
WASHINGTON STATE ENERGY OFFICE
400 E. Union, 1st Floor, ER-11 • Olympia, Washington 98504 • (206) 754-0700

May 13, 1986

The Honorable John W. Warner
Chairman, Subcommittee on Natural Resource
Development and Production
United State Senate
Washington, DC 20510

Re: Geothermal Questions - S.1322

Dear Senator Warner:

I very much appreciate receiving your letter of May 7, 1986, and I am extremely pleased to have this opportunity to respond to the questions which were submitted by Senator Johnston. The passage of Senate Bill 1322 is vital to the geothermal energy future of the Pacific Northwest, and I would be extremely pleased to assist the Committee in any way that you find helpful.

Sincerely,

R. Gordon Bloomquist

R. Gordon Bloomquist, Ph.D.
Geothermal Specialist

RGB/cg
B-R38-38

Enclosure

Response to Questions Submitted by Senator Johnston

1. **Do you support the administrative lease extension provisions, allowing successive 5 year extensions up to a total of 15 years, contained in S.1322?**

I am very much in favor of the lease extension provisions of S.1322. The need for such provisions stems from the inability of industry to secure a power purchase agreement or economically sell energy in this current period of electric power surplus and declining fossil fuel prices. The lease extension will allow industry to continue to explore for and confirm the existence of technically viable geothermal reservoirs which will be available to economically meet future energy demand.

2. **Do you have any suggestions for improving the diligent development requirements of the Geothermal Steam Act?**

Ensuring that diligent exploration will proceed during the term of the primary lease, as well as any subsequent extension, is extremely important if there is to be any benefit to society from the leasing of federal lands.

Diligence requirements, however, should not be structured to force industry to expend large sums of money inappropriately. For example, drilling should not be required before the use of other less expensive exploration steps have been completed. I therefore would urge the Committee to give careful consideration to providing industry with a high degree of flexibility in the design and implementation of a diligent exploration program. Such a program should not be tied to a specified number of holes or a set footage requirement, but should rather be tied to exploration expenditures.

In a like manner, I urge the Committee to allow for the extension of the primary lease term on leases not under an approved unit or cooperative plan but which are contiguous with leases which meet diligence requirements.

3. **Do you think that the average limitations of 51,200 acres per state is a good policy?**

I strongly supported increasing the average limitations from the previous 20,480 acres per state to the present 51,200 acres. I am also very aware that industry has expressed a strong desire for even more acreage per state. Since acreage in an approved unit is exempt from the acreage limitations, I would be opposed to any further acreage increase at this time. I would, however, support an exemption from the acreage limitation for acreage under development.

4. **You have, in the past, supported the concept of legislatively protecting nationally significant thermal features in our national parks and monuments. Is this your current position? Why do you think such legislation is necessary?**

I continue to support legislation which would provide added protection for significant thermal features in our national parks. Several of our national parks were created, at least in part, to protect the highly fragile thermal features in question. When these parks were created, those responsible for establishing the boundary could not anticipate that one day the exploitation of geothermal resources near the park boundary for energy production could possibly threaten the features which they had set out to protect. Protection should therefore be considered for Yellowstone, Mount Rainier, and Lassen National Parks. I, however, do not favor a

ban on leasing, exploration, and development in any established buffer zones, but rather encourage the granting of leases in these areas which carry special stipulations which, among other things, would provide for careful monitoring of any effects of such exploration and development. Such a monitoring system would provide the responsible regulatory agency with information which is necessary for making decisions concerning the level of development which can be supported without detrimentally affecting the thermal features which the parks were created to protect.

I would, however, urge the Committee to consider such legislation as a separate issue. The passage of S.1322 will not affect leasing or leases in close proximity to our national parks and the park question should not be allowed to slow the passage of this vital piece of legislation.

May 20, 1986

Honorable John Warner
Chairman
Subcommittee on Natural Resources Development
and Production
Committee on Energy and Natural Resources
Washington, D.C. 20510

Dear Senator Warner:

I am pleased to be able to respond to your inquiries of May 7, 1986 regarding geothermal leasing legislation. NPCA believes that any legislative amendments to the Geothermal Steam Act of 1970 must include specific recommendations and protection for national parks from geothermal development activities which occur on adjacent lands.

Question from Senator Johnston:

> "Do you view the extension of any particular outstanding federal geothermal lease as a threat to a significant thermal resource in a national park or monument?"

At the present time, geothermal leases have been issued on federal lands adjacent to Crater Lake National Park, Oregon. In addition, the Forest Service has approved leases in the Lassen National Forest next to Lassen Volcanic National Park, but these leases are subject to an administrative appeal, and are temporarily held in abeyance. Lease applications are filed and being considered by the Forest Service and/or the Bureau of Land Management around several other National Park System units. In addition, activities have occurred on private land and inholdings within the boundaries of both a national park (Lassen) and a national forest adjacent to a national park (Yellowstone).

In the case of Crater Lake National Park, leases were approved and issued last year by the U.S. Forest Service and the BLM covering 90,000 acres of the Winema National Forest along the entire eastern and most of the southern boundary of Crater Lake National Park. These leases were issued to California Energy Company (CEC), 333 Mendocino Avenue, Santa Rosa, CA 95401.

Conditions of the lease allow up to 24 wells to be drilled, although only 4 wells may be drilled before the company must itself assess whether they think there has been any effect on Crater Lake. Neither NPS nor Forest Service have any official role in thus determining whether to proceed with the additional 20 wells. These leases were also issued under a contingent right stipulation, which requires the company only to assess potential impacts of the exploratory phase of their work, does not require the company to assess the impact of either the full development phase or the cumulative effect of both exploratory and full development phases on the park.

National Parks and Conservation Association
1701 Eighteenth Street, N.W., Washington, D.C. 20009
Telephone (202) 265-2717

In addition to these approved leases on the Winema National Forest, CEC has multiple lease applications pending for many thousands of acres on the Rogue River and Umpqua National Forest covering the western and northern boundaries of Crater Lake National Park.

Of related concern, the Federal Register of March 17, 1986 (51FR9097) contained an announcement from the Department of Energy that it has $400,000 available in FY 1986 to cost share with any geothermal energy company for exploration and development in the Cascade Range of Oregon and Washington. Since it appears that CEC is the only company capable of geothermal activity in the Cascade Range in 1986, it appears that DOE may be about to subsidize the drilling around Crater Lake. It continues to be a concern of NPCA's that other federal agencies do not consider the potential conflicts of their actions with the mandates of other federal agencies. Since the NPS is charged with preserving Crater Lake and explicitly with preserving the quality and clarity of water in the lake, no other federal agency should blindly assist in actions which are contrary to that mission.

Questions of Senator Bumpers:

> "What national parks and monuments contain thermal features that you believe may be threatened by geothermal energy exploration and development?"

1.

NATIONAL PARK SYSTEM UNITS WITH KNOWN THERMAL FEATURES
OF NATIONAL SIGNIFICANCE

Park Unit	State
Aniakchak National Monument & Preserve	AK
Bering Land Bridge National Park & Preserve	AK
Denali National Park & Preserve	AK
Gates of the Arctic National Park	AK
Glacier Bay National Park	AK
Katmai National Park	AK
Lake Clark National Park & Preserve	AK
Wrangell-St. Elias National Preserve	AK
Yukon Charley Rivers National Preserve	AK
Hot Springs National Park	AR
Lassen Volcanic National Park	CA
Sequoia National Park	CA
Hawaii Volcanoes National Park	HI
Haleakala National Park	HI
Yellowstone National Park	ID, MT, WY
Lake Mead National Recreation Area	NV
Big Bend National Park	TX
Mt. Rainier National Park	WA
Olympic National Park	WA
Grand Teton National Park	WY
John D. Rockefeller, Jr. Mem. Highway	WY

2. "Do you believe additional legislation is necessary to protect adequately the thermal features in our national parks and monuments?"

We believe that any legislation to amend the Geothermal Steam Act of 1970 must take into consideration the affects that this development will have on units of the National Park System. This can be accomplished by:

A. prior to the issuance of any lease or the extension of any lease, requiring the Secretary of the Interior to publish a list of nationally significant features within units of the National Park System. The development of this list should be subject to notice and public comments and provide the public the right to petition for additional nominations to the list. The criteria to be used to determine "national significance" should include:

(1). size, uniqueness and other characteristics of such features
(2). the scientific or geologic significance of such features
(3). the extent to which such features remain in an undisturbed natural condition
(4). the relationship between such features and other features, resources, and values of a park system unit, including scenic, scientific, wildlife and wilderness values;

B. defining a geographic zone outside national park boundaries where such development may affect the nationally significant features;

C. defining the conditions under which the Secretary may issue leases within these geographic zones;

D. providing the Secretary the right to deny leases for exploration and development on non-federal lands within parks or geographic zones if a "foreseeable significant adverse effect" on a nationally significant geothermal feature is indicated;

E. prior to the issuance of any lease, requiring a finding to determine if indisputable evidence exists to indicate that thermal development activity will in no way affect those features within adjacent national parks;

F. requiring a strict monitoring system for detecting possible adverse effects to a park unit's thermal features;

G. providing the Secretary immediate authority to halt geothermal development activities if present evidence indicates a potential negative impact on park resources;

H. requiring Federal Register notice and the opportunity for public comment each time the Secretary proposes to issue a lease within one of the designated geographic zones and each time he proposes to modify one of the zones based on new data;

I. requiring that spent fluids be reinjected into each geothermal well within such zones to help assure maintenance of the necessary hydrostatic pressure in the subterranean geothermal system in order to lessen the chance of damage to such features;

J. requiring continuous monitoring and periodic reporting to Congress of geothermal leasing and development activity in any of the designated geographic zones.

3. "Many say that there is sufficient authority currently to protect the thermal features in our national parks and monuments? Do you agree?

No, we do not agree that there is sufficient existing authority to protect the thermal features in our national parks and monuments. The case of Lassen Volcanic National Park is a prime example of the need for changes in the legislative authorities. Geothermal leases are being let on lands in the adjoining national forest with little or no consideration being given to the potential affect on the thermal features of the park. The U.S. Forest Service has no mandate or authority to require lease stipulations which could serve to protect the park's resources. Its authorities speak only to affects which occur directly on Forest Service lands and ignore the far reaching impacts that geothermal development has on adjacent lands protected by other agencies.

The Department of Energy is seeking to encourage the development of geothermal resources but has been given no direction to require the consideration of the possible adverse affect these activities will have on park lands. The federal government is subsidizing activities that maybe adversely affect park resources and therefore, should be required to act to mitigate, if possible, these impacts.

I am happy to be able to respond to these questions and will provide any additional information which you feel would be useful.

Sincerely,

T. Destry Jarvis

T. Destry Jarvis
Vice President

TDJ/sb

APPENDIX II

Additional Material Submitted for the Record

Unocal Corporation
1201 West 5th Street, P.O. Box 7600
Los Angeles, California 90051

UNOCAL 76

May 8, 1986

Senator Chic Hecht
Senate Energy and Natural
Resources Committee
Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Hecht:

I would like to extend my appreciation again for the invitation to appear before your subcommittee on April 24, 1986, regarding S. 1322.

However, for the record, further comment is necessary to address the statement entered by Mr. Jarvis of the National Parks and Conservation Association. The concerns expressed by Mr. Jarvis are inappropriate to this legislation. Your bill is not an omnibus geothermal bill, but a specific bill aimed at a single, but serious problem of the industry. If. S. 1322 is not enacted in its present form, industry activity will certainly decline from its current low level of exploration and drilling. Amendments suggestd by Mr. Jarvis would further imperil the industry.

As I indicated in my oral presentation to the committee, we feel current environmental laws more than adequately address the concerns voiced by Mr. Jarvis. The procedures of the Department of the Interior are quite clear as to the environmental assessments that must be made prior to leasing. The environmental consequences are reviewed and a determination is made as to whether a lease may be issued. If the review suggests leasing may proceed, appropriate stipulations are attached to the lease to protect any anticipated environmental consequences.

There appears to be no necessity to protect what is already more than adequately protected. The concern addressed by this legislation involves primarily current leases and is designed to resolve a serious problem plaguing the further development of this country's geothermal resources.

Sincerely,

Joseph L. Wilson

Joseph L. Wilson
Vice President &
General Representative
Geothermal Division

cb

Geothermal Resources International, Inc.

Domenic J. Falcone
Executive Vice President

May 7, 1986

Senator Chic Hecht
United States Senate
302 Hart Senate Building
Washington D.C. 20510

Dear Senator Hecht:

Enclosed as supplemental testimony on Senate Bill 1322, A Bill to Amend the Geothermal Steam Act of 1970, are two memoranda from professionals who work for our Company. One is from Thomas I. Hamilton, Esq., Natural Resources Counsel of our Company and the other is from Mr. Peter A. Hansen, Vice President-Land of our Company.

I believe that these memoranda offer appropriate comments and criticisms of other testimony made at your Subcommittee hearing as well as suggested language which could clarify and strengthen your announced intentions as far as assisting the geothermal industry in this very important matter.

If you have any questions, please do hesitate to contact me or my associates. We appreciate the opportunity to make our views known to you on your very important proposed bill.

Very truly yours,

Domenic J. Falcone/ah

Domenic J. Falcone

DJF/ah
Enclosures

1825 South Grant Street, Suite 900, San Mateo, CA 94402 (415) 349-3232

MEMORANDUM

TO: Domenic J. Falcone

FROM: Thomas I. Hamilton

DATE: May 7, 1986

RE: S.1322, A Bill to Amend the Geothermal Steam Act of 1970

The following comments rebut portions of the April 24, 1986, testimony of Robert H. Lawton, Deputy Assistant Director, Energy and Mineral Resources, BLM (DOI) before the Senate Subcommittee on Natural Resources Development and Production, relating to S.1322:

1. Mr. Lawton suggests modification of S.1322's proposed Section 6(a) in order to prevent an interpretation which allows for leases within a designated Unit Area to be saved from expiration unless they are included within an actual Participating Area.

Mr. Lawton's modification should not be adopted because the interpretation he seeks to prevent is precisely the result which would expedite geothermal resource production on federal lands.

The original Unit Area is designated such because it is "an area logically subject to development and/or operation under a unit or cooperative agreement" based on geological and geophysical information (43 CFR §3281.2). It is envisioned that Participating Areas are to be revised from time to time (43 CFR §3283.3) presumably by enlargement, as additional wells prove additional parts of the Unit Area to be productive. If lease expiration occurs during this process, it does not seem appropriate that only leases then being drained (i.e. the Participating Area) should be saved. On the contrary, production tends to validate the original geological rationale for the entire Unit Area. Therefore, commercial production within a validly designated Unit Area should save all leases within that Unit. Thereafter, market forces should be relied upon to guaranty appropriate development and resource utilization.

2. Mr. Lawton also requests deletion of the proposed amendment to Section 6(c)(1) to prevent the DOI from having to make a subjective determination whether a lessee's efforts to commence production are bona fide. S.1322 as proposed does not require such an affirmative finding, but instead would allow for rejection of the extention if the lessee's efforts, as detailed

in the required report, are so de minimis as to lack qualification as being bona fide. If the words "bona fide" still trouble Mr. Lawton, they could probably simply be deleted, without much impact.

3. Mr. Lawton suggests modifying S.1322's Section 6(c)(2) by substituting new language for the entire Section in order to "preserve existing opportunities for lease extensions". However, a close reading reveals that all opportunities provided under the language he suggests are similarly available under the language of S.1322 as proposed.

4. Mr. Lawton believes a windfall will occur for the lessees if leases are saved before they are included in a unit plan of development. On the contrary, under the situation he addresses, if the lessee obtained the lease in good faith, paid rentals in a timely fashion and expended money to drill on a nearby lease, and if such drilling has been deemed to benefit the lease in question, it does not seem to be a windfall to allow him to retain that lease for further exploration. On the other hand, if Mr. Lawton's language is accepted, there does seem to be a windfall in favor of the subsequent lessee of any such lease which is lost, in the form of the prior lessee's nearby drilling activity.

5. Mr. Lawton's suggested change to Section 6(c)(3) as proposed should not be accepted, if for no other reason than because it bases lease extensions not upon when a well is "commenced", but rather upon when it is "drilled" or completed. Under such constraints a lessee will not know whether the well he begins to drill 60 days before lease expiration will save that lease or not!

6. Mr. Lawton misreads Section 3 of S.1322 as providing review of lease status within a unit every five years in addition to the standard review conducted by the BLM. It is the clear intent that this five (5) year interval review should apply in lieu of any more frequent review.

7. Mr. Lawton's final comment on the retroactivity of S.1322 is based, at least in part, upon his belief that problems would be created if a lease which had been lost between the retroactive date and the date S.1322 is enacted has, during that time, been leased to some other party. Clearly such leases, if any, should be easily determined to be not subject to reinstatement by whichever administrative body reviews the extension application.

TIH:jla

cc: P.A. Hansen

a399j

MEMORANDUM

To: D.J. Falcone

From: P.A. Hansen PAH

Date: May 5, 1986

Re: S.1322
Geothermal Steam Act Amendments of 1985

I have reviewed the written testimony that was presented at the hearing (4/24/86) on the captioned bill. My comments are as follows:

1. Testimony given by Destry Jarvis, National Parks and Conservation Association.

   The subject of Mr. Jarvis's testimony does not address, pro or con, any of the issues surrounding S.1322. His concerns relating to geothermal exploration and development within the parks system would be more appropriately addressed in a separate piece of legislation, although it is my personal opinion that quite possibly much of his concern could be handled adequately under current existing rules and regulations governing geothermal exploration and development on Federal lands.

2. Testimony given by Robert H. Lawton, Deputy Assistant Director, Energy and Mineral Resources, BLM.

   Before commenting on specific items in his testimony, I think it necessary to remind ourselves as to what categories of leases we are dealing with.

   Category 1. These are individual geothermal leases standing on their own.

   Category 2. These are geothermal leases within a unit plan.

   Category 3. These are geothermal leases that have been extended to December 31, 1986 by virtue of meeting certain criteria as set forth in the rider to the Interior's Appropriation Bill of July 24, 1984. Category 3 leases could also fall under either Categories 1 or 2 above.

All three (3) categories of these leases will be affected by the provisions in this bill.

Of utmost concern are those leases in Category 3. They have met the exacting requirements to be extended to December 31, 1986, however this latter date is fast approaching and some provision has to be made to extend them beyond this date. A method to do so will follow in this discussion. There were 27 leases in Nevada under this category.

The Section references following refer to Sections of the Geothermal Steam Act of 1970 unless stated otherwise.

Section 6(a)

There is a need to extend geothermal leases as a whole within a unit plan, if based upon geological and geophysical information, commercial production is found and, as such, validates the rationale for forming the unit in the first place. Thus, this proposed Section should be adopted.

Section 6(c)

Section 6(c)(1) as proposed, should be workable if the lessee or operator of the lease submits relevant and factual information, such as performance and timely monetary expenditures under the individual lease or unit plan, preparation of environmental studies leading to a development project, the obtainment of or diligent efforts to secure a steam and/or associated geothermal resources sales contract, the initiation of the permitting or application process for the acquisition of transmission right-of-ways and plant sites and the obtaining of bids for the design, feasibility and construction of such transmission lines and power plants, etc.

Section 6(c)(2) is acceptable as proposed, however, it could be modified as follows, and thus be satisfactory to all parties.

Section 6(c)(2), line 19 - delete the words "application for extension is made" and insert "drilling commences".

Section 6(c)(3) as proposed, could cause some administrative problems in the area of interpreting "substantial investment". This could be resolved by applying a formula, based upon acreage held and depth to potential resource, to provide for a reasonable additional investment over and above the diligent exploration expenditure ("DEE") requirement for individual leases or on unit expenditure requirements covering leases committed to a unit plan. This would eliminate the need for any subjective determination.

Section 18

The review period, as proposed by Section 3, would appear to me to be more easily administered than any review period currently existing in the regulations.

Also, the recent change in regulations regarding acreage chargeability , ie: increased from 20,480 to 51,200 acres per State, should alleviate some of Senator Hecht's concerns regarding potential abuses of the unit plan concept, ie: enable a lessee to hold large amounts of acreage for chargeability purposes.

Section 4 (S.1322)

Reference has to be made in this Section to those leases that have been extended to 12/31/86 for reasons stated previously.

I think Senator Hecht's objective and Mr. Lawton's concern can be satisfied if this Section is amended in total to read as follows:

> "Every geothermal lease issued pursuant to the Geothermal Steam Act of 1970, which has either (1) met the criteria set forth in the rider to the Interior's Appropriation Bill of 7/27/84 and has had its term extended to 12/31/86, or (2) is in effect, as of the date of enactment of S.1322, would be eligible for an administrative extension under Section 6 (c) of the Act as amended if an application for such an extension is timely submitted either within one hundred eighty days of the date of enactment of this Act or sixty days prior to the expiration of the lease's primary term, whichever is later".

MM

OXBOW GEOTHERMAL

April 7, 1986

Senator Chic Hecht
United States Senate
Washington, DC 20510

Re: S. 1322
Attention: Scott J. Cameron

I am in receipt of S. 1322 sponsored by Senator Hecht and generally believe that it is a well thought through and written piece of legislation. It is responsive to the needs of geothermal developers without abdicating BLM's managerial responsibilities.

The legislation addresses two key difficulties faced by those who seek to develop the nation's vast geothermal resources into productive geothermal fields and into electrical generating facilities:

1. The uncertainty associated with pre-discovery operations
2. The multitude of filings required for geothermal leases on federal lands

The legislation offers some relief to developers who are actively pursuing bona fide efforts to bring leases into commercial production. Oxbow Geothermal therefore supports Senate 1322.

Please contact me if I am able to provide any additional information on this matter. Thank you for your attention.

Sincerely,

Aviv Goldsmith
Environmental Coordinator

pc: Robert List, Esq.

Oxbow Geothermal Corporation
200 South Virginia Street-Suite 450, Reno, Nevada 89501
Telephone 702 322-1300, Telecopier 702 322-1363
Telex 5106008690 OXBOW RENO NV

Diamond Shamrock
Thermal Power Company

Russell K. Burbank
President

April 18, 1986

The Honorable Chic Hecht
2H-302 Hart Senate Office Building
United States Senate
Washington, D.C. 20510

Dear Senator Hecht:

I am writing to express Thermal Power Company's support for the proposed changes to the Geothermal Steam Act of 1970 made by your bill, S.1322, which provides for extensions of federal geothermal leases. The criteria of substantial investment on the lease and drilling to a specific depth are reasonable grounds for extending a lease where commercial production of geothermal resources has not been established. Although none of our federal geothermal leases is currently expiring by failure to establish commercial production, we recognize that other geothermal developers may have considerable investments in federal geothermal leases which are now in jeopardy.

S.1322 also would encourage confirmation of geothermal resources in areas where a market may be slow to develop. For example, Thermal Power plans to commence exploration drilling this summer on a federal geothermal lease in Oregon, although additional electrical generation capacity in the Pacific Northwest may not be needed for 10-15 years. Resource confirmation efforts must begin now to meet future demand because of the long lead time required for geothermal resource planning, permitting, and exploration before electricity can be produced.

We therefore support this legislation to encourage the development of alternative energy sources for domestic consumption.

Sincerely,

Russell K. Burbank jjd

JW/0388L

Thermal Power Company
A subsidiary of Diamond Shamrock, 601 California Street, San Francisco, California 94108
Phone 415 981-5700, Telex 34387 DIASHAM SFO